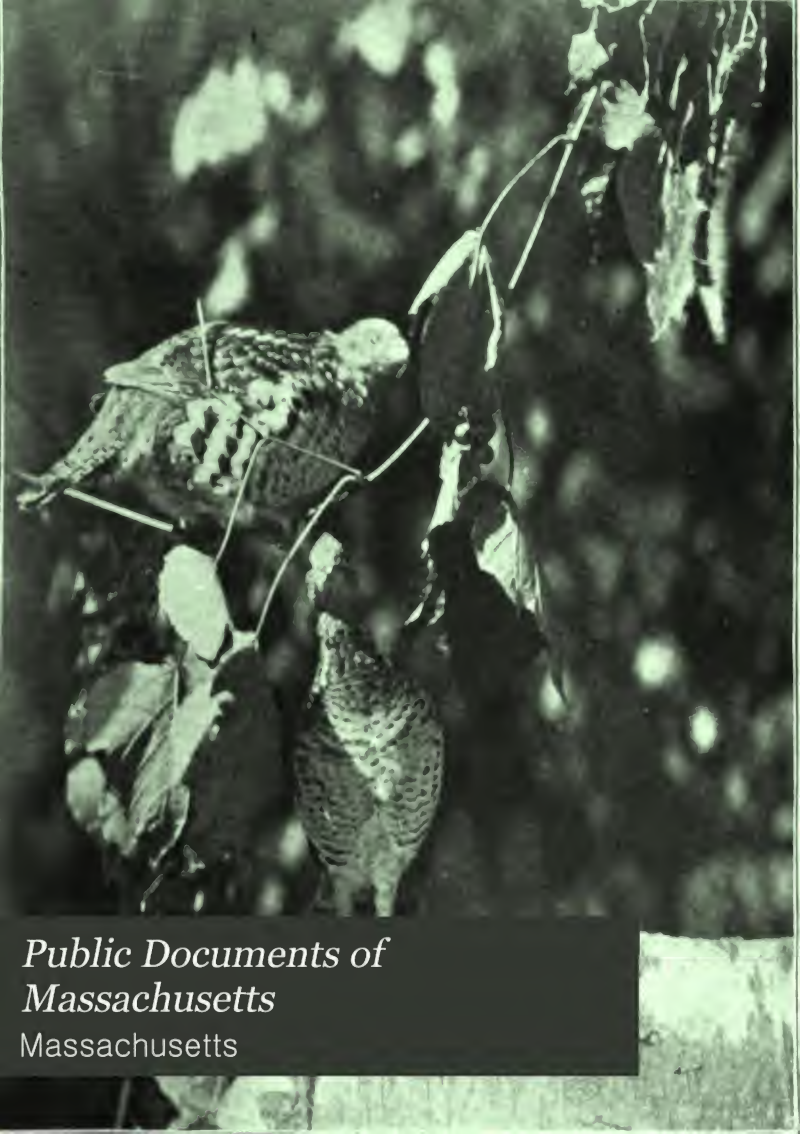


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BEING THE

ANNUAL REPORTS

OF VARIOUS

PUBLIC OFFICERS AND INSTITUTIONS

FOR THE YEAR

1905.

PUBLISHED BY THE SECRETARY OF THE COMMONWEALTH.

VOL. XII.

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INDEX TO PUBLIC DOCUMENTS.

SERIES 1905.

VOL. I.

Report of the Secretary of the Commonwealth, ... 46
Report of Treasurer and Receiver General, ... 5
Report of Auditor of Accounts, ... 6
Report of Attorney-General, ... 12

VOL. II.

Report of Tax Commissioner, ... 16
Aggregates of Polls, Property and Taxes, ... 19
Abstract of Certificates of Corporations, ... 10
Report of Controller of County Accounts, ... 29

VOL. III.

Report of State Board of Charity, ... 17
Report of State Board of Insanity, ... 68
Report of Trustees of the Danvers Insane Hospital, . . 20
Report of Trustees of the Northampton Insane Hospital, . 21
Report of Trustees of the Taunton Insane Hospital, . . 22
Report of Trustees of the Worcester Insane Hospital, . . 23
Report of Trustees of the State Hospital, ... 26
Report of Trustees of the Westborough Insane Hospital, . 30
Report of Trustees of the Foxborough State Hospital, . . 47

Digitized by Google

Report of Trustees of the Medfield Insane Asylum, . . . 59
Report of Trustees of the Massachusetts State Sanatorium, . 61
Report of Trustees of the Massachusetts Hospital for Epileptics, 62
Report of Trustees of the State Colony for the Insane, . . 70

Vol. IV.

Report of State Board of Health, ... 34
Report of Board of Registration in Medicine, ... 56
Report of Board of Registration in Dentistry, ... 38
Report of Board of Registration in Pharmacy, . . . 39
Report of Metropolitan Water and Sewerage Board, . . 57

Vol. V.

Report of Board of Railroad Commissioners and Returns of Railroad Corporations, ... 14
Report of Board of Gas and Electric Light Commissioners, . 35

Vol. VI.

Report of Commissioners of Savings Banks (Part I. — Savings Banks, Institutions for Savings, Safe Deposit, Loan and Trust Companies. Part II. — Co-operative Banks, Collateral Loan Companies, Mortgage Loan and Investment Companies), 8

Vol. VII.

Report of Insurance Commissioner (Part I. — Fire and Marine. Part II. — Life, Casualty and Assessment), . . . 9
Report of Commissioners of Firemen's Relief Fund, . . 64

Vol. VIII.

Report of Secretary of State Board of Education, . . . 2
Report of Trustees of the Perkins Institution and Massachusetts School for the Blind, ... 27

Digitized by Google

Report of Trustees of the Massachusetts School for the Feeble-minded, ... 28
Report of Librarian of the State Library, ... 3
Report of Free Public Library Commission, ... 44
Report of Commissioner of Public Records, ... 52

Vol. IX.

Report of Secretary of the State Board of Agriculture, . . . 4
Report of the Hatch Experiment Station of the Massachusetts Agricultural College, ... 33
Report of Trustees of the Massachusetts Agricultural College, 31
Report of State Dairy Bureau, ... 60
Report of Superintendent for suppressing the Gypsy and Brown-tail Moths, ... 73

Vol. X.

Report of Adjutant General, ... 7
Report of Chief of the District Police, ... 32
Report of Board of Prison Commissioners, ... 41
Report of Board of Police for City of Boston, ... 49
Report of Board of Police for City of Fall River, ... 58
Report of Commissioner of State Aid and Pensions, . . . 68
Report of Board of Conciliation and Arbitration, ... 40
Report of Trustees of the State Lyman and Industrial Schools, 18
Report of Trustees of the State Farm, ... 24

Vol. XI.

Report of Registration of Births, Marriages and Deaths, with Statistics of Divorce, and of Deaths investigated by the Medical Examiners, ... 1
Report of Bureau of Statistics of Labor, ... 15
Returns of Number of Assessed Polls, Registered Voters, etc., 43
Report of Cases of Contested Elections, ... 37

Digitized by Google

Vol. XII.

Report of Board of Harbor and Land Commissioners, . . 11
Report of Commissioners on Fisheries and Game, . . . 25
Report of Commissioners of Nautical Training School, . . 42
Report of Metropolitan Park Commission, ... 48
Report of Civil Service Commission, ... 53
Report of State Highway Commission, ... 54
Report of Wachusett Mountain State Reservation Commission, 65
Report of Commissioners on War Records, ... 66
Report of Greylock Commission, ... 67
Report of State Board of Publication, ... 69
Report of Charles River Basin Commission, ... 71
Report of Board of Registration in Veterinary Medicine, . . 72

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PUBLIC DOCUMENT . . . . . No. 11.

TWENTY-SEVENTH ANNUAL REPORT

OF THE

BOARD OF HARBOR AND LAND COMMISSIONERS.

FOR THE YEAR 1905.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Approved by

The State Board of Publication.

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Commonwealth of Massachusetts.

REPORT.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, pursuant to the provisions of law, respectfully submits its annual report for the year 1905, covering a period of twelve months, from Nov. 30, 1904, being the twenty-seventh annual report of the Board since its establishment by chapter 263 of the Acts of 1879.

From Dec. 1, 1904, to Nov. 30, 1905, the Board has held 211 meetings, has given 305 formal and informal hearings, and has received 161 petitions for license to build and maintain structures and for privileges in tide waters, great ponds and Connecticut River, to dredge material, to remove material from beaches, and for other purposes.

One hundred and six licenses for structures and privileges in tide waters, great ponds and Connecticut River have been granted during the year; also 48 permits for dredging, for the removal of material from beaches, and for other purposes.

Forty-eight inspections have been made at various times by and under the direction of the Board, of work completed and in progress; also of sites of authorized work, under appropriations made by the Legislature, relating to: dredging operations in Boston harbor; improvements on the Commonwealth's flats at South Boston; the reclamation of the Province Lands in Provincetown; protective works on Connecticut River at Agawam, Hadley, Hatfield and West Springfield; Bass River in Beverly; wall and jetties at Stony Beach in

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Hull; Stage harbor and Bucks Creek in Chatham; jetties and channel at Menamsha Inlet; jetties and channel at Lake Anthony; Vineyard Haven harbor; jetties and channel in Bass River at South Yarmouth; Lewis Bay in Yarmouth; East and West bays at Osterville; Cotuit harbor; Witchmere harbor in Harwich; Apponagansett harbor; Herring River in Harwich; Nantucket harbor; Cuttyhunk harbor; Paskamansett River in Dartmouth; site of proposed breakwater in Revere; Nashawena Island; also upon petitions and plans presented to the Board of the sites of proposed work in tide waters, the location of wrecks and obstructions to navigation; various structures built under licenses from the Board; sites of alleged dumping of material into tide waters; town boundary survey work; State boundaries.

Through transactions of the Board there has been paid into the treasury of the Commonwealth during the past year, from rents, licenses, sales of land and other sources, and credited to the Commonwealth's flats improvement fund and the harbor compensation fund for Boston harbor, the aggregate sum of $133,563.42.

During the year the Board made 13 new contracts,* involving the estimated expenditure of $72,741.88.

Boston Harbor.

Combined activity is essential to success in the competitive business of the present day. The greatness of the port of Boston is dependent not only on deep and commodious water ways, but upon the volume of business that can be attracted hither.

While the railroads are and must continue to be the great originators as well as transporters in enlarging the volume of exports, the merchants are the ones upon whom rests the responsibility of enlarging the volume of imports. It is a truism to assert that these volumes have interdependent trade relations.

The twelve months ending Nov. 30, 1905, show a value at the port of Boston of imports amounting to $106,993,964,

* See Appendix A.

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and of exports, both domestic and foreign, of $90,715,904, which together sum up $197,709,868. Of this, the total foreign exports were $839,628.

During the same period the coastwise tonnage of vessels entering and leaving the port was as follows, viz.: 5,618 vessels of all kinds from southern ports registered a gross tonnage of 6,262,217, and 3,322 vessels from eastern ports 2,530,415, or a total of 8,792,632; while the foreign net registered tonnage of 165 American vessels was 219,361 and of 1,349 foreign vessels was 2,559,528, or a total of 2,778,889.

A new steamship line, between this port and China, Japan and Singapore, or rather an extension of the service that has heretofore been plying to New York, has been established, and the first steamer arrived here November 24.

The Elder-Dempster line has announced the establishment of a line between Melbourne and Boston, with monthly sailings, but the first steamer has not as yet left Australia.

Our coastwise lines have been increased by the addition of the Maine Coast Transportation Company, which operates two steamers between here and ports of the State of Maine.

Of course freights, whether outward or inward, are relatively less at the port where the steamships can find a return cargo. Boston should be developed as a great entering and forwarding port for the cities of the mid-sections of the country. Importing merchants of the interior should be generally and continuously informed of the advantages in the way of speedy and courteous custom house examinations, economies in handling and facilities for inland transportation at reasonably low freights which may be enjoyed by patronizing this port.*

While the Federal government is deepening and widening the harbor channels and the Commonwealth is improving the anchorage basins and increasing the wharf accommodations, the merchants should persevere in providing the business, that nothing may be done in vain, and that working together the largest results may be accomplished concurrently with

* It is worthy of note that importations through the port of Boston during the fiscal year of 1905 increased 24 per cent., as against a gain of 13 per cent. at New York and about 12 per cent. at Philadelphia.

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the greatest economy toward holding the chief port in New England as the second in importance in the country.

Foreign commerce is a great educator, and the more of it we try to get and have to deal with, the earlier shall we begin to discover some of the problems essential to be understood in order to guide it in a desired direction.

Unwise legislation may interfere with its rapid development. Antagonistic interests may procure the establishment of obstacles. Uncontrollable differentials may assist in the diversion of exports to harbors less safe and easy of access and farther from foreign ports of destination. But the port of Boston is unalterably fixed in its physical and geographical relationship to the vast interior of this continent and in the path of easy transit to the eastern hemisphere.

What can be done by the Legislature of the Commonwealth and the merchants of greater Boston should be, in determining the right influences of legislation, both State and national, which, by aiding and not obstructing the laws of economical and commercial growth, may shape advancement on lines of safe and sure progress, while avoiding the errors of ignorance.

A decade ago a commission was appointed to investigate the wants of Boston for improved docks, wharves and terminal facilities. In January, 1897, the commission made its report to the Legislature, recommending on the part of the Commonwealth public ownership of a portion of the fore shore; the building of a great pier with a proper avenue of approach; the improvement of the anchorage basins; changes in the railroad tracks and terminals at East Boston; also the improvement of the harbor channels and the building of a large dry dock at the Navy Yard by the Federal government.

The recommendations were timely; already had begun the change in the draft and carrying capacity of transatlantic steamships, which marked the advance in requirements for channels, docks, basins and piers far in excess of any demands hitherto made.

A comparison of sizes of the mail steamships built by the Cunard Company within the last forty years may be interesting and instructive: —

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	1865. "Java."	1884. "Umbria."	1905. "Carmania."
Length,	337′	500′	672′ 6″
Breadth,	42′ 6″	57′ 3″	72′
Depth,	27′ 7″	39′	52′
Gross tonnage,	2,697	8,127	19,524
Indicated horse-power,	2,650	14,500	21,000
Speed in knots,	14	19.5	19

The weight or displacement of the "Carmania" when loaded to a draft of 33′ 3¼″ is calculated to be 30,918 tons. It is said that there is no indication at present that transatlantic steamships have reached their ultimate development as to size, and the recent application of the epoch-making steam turbine for power in place of the reciprocating engine surely adds a new and uncertain factor in any calculations.

To anticipate the requirements of the largest class of vessels, the harbor channels had to be widened and deepened, and the projects for improvement by the Federal government were made to keep pace with the movement. The economic advantages of larger vessels became so conspicuous as to extend their influence to the coastwise carriers, and the coal and lumber schooners increased beyond the five mast limit to six and even to one of seven masts, with a loaded draft of 28 feet when carrying 8,000 tons of coal. This increased draft led directly to a desire for greater depth of water when lying at anchor, and thus the anchorage basin project off Bird Island flats became an early necessity; and where formerly that well-known anchorage area had but an average of about 13 to 18 feet at mean low water, there is at present a depth of 30 feet over the area thus far completed. By the time the existing projects of both the State and national governments are carried out, others will be needed to enable the accommodations and required facilities to keep pace with the demand and maintain the port as one of the first order.

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The original project for improving the channels of the harbor was adopted by Congress in 1867. The lower main ship channel below President Roads had then in places a width of only 150 feet, with a depth of 23 feet; and the upper main ship channel above President Roads had a least width of 100 feet and a least depth of 18 feet. In 1892 the Federal government proposed to widen these channels to 1,000 feet, with a depth at mean low water of 27 feet. This project is substantially completed.

In 1899 the project of making a new channel entrance to the harbor through Broad Sound, 30 feet deep and 1,200 feet wide, was adopted. That channel is now completed, and a lighthouse at its entrance has been erected on the Graves, from which the light was first exhibited Sept. 1, 1905, completing, with the range lights on Lovells Island for the seaward arm, and on Spectacle Island for the inner arm, the lighting of that channel. In 1902 the project of deepening the upper channel above President Roads to 35 feet, with a width of 1,200 feet, and of cutting an entirely new channel through Broad Sound, 35 feet deep and 1,500 feet wide, was adopted. In carrying out this project it was thought best to split it lengthwise; and now the upper channel is being dredged 600 feet wide, or one-half the width; and when completed so as to give access to the steamship and railroad wharves, the other half will be undertaken. Thus the commerce of the port will not be delayed for the completion of the whole project before enjoying some of the benefits intended. It is expected that the dredging of the limited width of channel 35 feet deep from the sea to the wharves will be completed by Dec. 31, 1907. The completion of the entire project of 1902, however, will not afford free access to the wharves of the New England Railroad company and the Commonwealth pier; but it will be necessary to increase the width of the main ship channel some 700 to 800 feet for a length of half a mile, in order to provide an approach similar to that enjoyed by the other railroad and steamship wharves in the harbor above. This additional project should be urged before Congress in due time.

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Anchorage.

By chapter 476 of the Acts of 1901, the Board was authorized to excavate a basin and to build and maintain structures in Boston harbor northerly of the main ship channel, for the purpose of providing mooring facilities and additional anchorage ground. The expenditure of $1,000,000 was authorized by this act, not more than one-fourth part to be expended in any one year.

In 1902 contracts were entered into for dredging an area lying along the northerly side of the main ship channel in the upper harbor, covering about 1 mile in length and 1,000 feet in width, to a depth of 30 feet at mean low water; and for the purpose of doing the work economically and expeditiously, the total area was divided into four sections of nearly equal areas and excavation.

Since the report of last year an additional amount of 160,021 cubic yards has been excavated wholly from sections 1 and 2, leaving 443,814 cubic yards yet to be dredged. In sections 3 and 4 about 581,217 cubic yards are yet to be removed.

The reason of the slow performance by the contractors is their having contracts with the Federal government for excavating portions of the main ship channel of Boston harbor; and, inasmuch as the government project and its completion seemed to the Board of paramount importance, it has refrained from taking severe measures to compel the progress of the work on the anchorage basin while all the dredging machines of the contractors were engaged in the work of the government on the main ship channel.

The space available for the anchorage of deep-draft vessels has been materially increased, and as yet there seems to be no suffering for lack of larger area on account of the delays.

The approximate amount of material, scow measurement, remaining to be excavated from each section, and the total amount, scow measurement, excavated to Dec. 1, 1905, are as follows: —

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	Total Amount excavated to Dec. 1, 1905 (Cubic Yards).	Approximate Excavation to be made (Cubic Yards).
Section 1, ...	553,784	189,716
Section 2, ...	495,202	254,098
Section 3, ...	440,783	302,917
Section 4, ...	474,100	278,300
Totals, ...	1,963,869	1,025,031

The total amount expended on this project to Dec. 1, 1905, is $275,707.07.

DORCHESTER BAY.

The dredging of anchorage basins in Dorchester Bay, off the southerly shore of South Boston, authorized by chapter 425 of the Acts of 1902, has continued during the year under contract with the Eastern Dredging Company and the New England Dredging Company, jointly, made Oct. 29, 1902, at the price of 21 cents per cubic yard, measured in scows, the work to be done during the years 1902–03–04–05, and the expenditure not to exceed $25,000 in each year. The contract provided for the completion of the work June 15, 1905, and for the excavation of two areas respectively known as the 9-foot area and the 6-foot area. The 6-foot area is located near the L Street bath house and the landing of the Mosquito Fleet Yacht Club, and the dredging of this area was completed early in June, 1905.

The dredging of the 9-foot area, located near the public landing of the South Boston and Boston Yacht Club houses, was unavoidably delayed, and could not be completed at the date specified, an area of about 375,000 square feet still remaining to be excavated. The work was suspended June 15 for the summer, in order that the dredge and mud scows might not interfere with the use of the area by the yachts. The remaining work will be completed during the winter and spring, so that the whole area will be available

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for anchorage before the beginning of the next yachting season.

During the year 105,965 cubic yards have been excavated, making a total of 445,214 cubic yards to Dec. 1, 1905. The total amount expended to the same date is $82,648.96. The balance of the appropriation will be expended in completing the work.

Dredging Easterly Shore of Dorchester.

Under authority of chapter 439 of the Acts of 1903 the channel leading from the main channel of Neponset River was enlarged in 1904, and extended northwesterly from the main channel about 700 feet, 75 feet wide on the bottom and 12 feet deep at mean low water. An anchorage basin for the use of yachts was also dredged between Savin Hill and Commercial Point in this locality, covering about 4½ acres, 9 feet deep at mean low water, the total amount expended for this improvement to Dec. 1, 1904, being $25,363.66.

By chapter 453 of the Acts of 1905 the Board was authorized to dredge the channel leading from Commercial Point in a northwesterly direction, in extension of the channel dredged under authority of chapter 439 of the Acts of 1903, to a depth not exceeding 12 feet at mean low water and to a width not exceeding 75 feet, the act of 1905 permitting the expenditure of $5,000 therefor in the year 1905, and the same amount in 1906.

Proposals for dredging a channel about 1,600 feet long, 75 feet wide on the bottom and 12 feet deep at mean low water, were received on Oct. 26, 1905, and contract entered into Oct. 30, 1905, with the New England Dredging Company, the lowest bidder, the contract price being 23⅞ cents per cubic yard, measured in scows. The amount of excavation is estimated to be about 35,500 cubic yards, *situ* measurement, the work to be completed by May 31, 1906.

The total amount expended on this improvement since the passage of the act of 1903 aforesaid, to Dec. 1, 1905, is $26,359.19.

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Commonwealth Flats at South Boston.

The Commonwealth owns a large tract of filled land at South Boston, commonly known as the South Boston flats, shown on the plan accompanying the annual report of the Board for 1903, and located both northerly and southerly of Summer Street, easterly of the railroad terminal, and having a long frontage on Boston upper harbor and the reserved channel.

The area northerly of Summer Street is 4,317,234 square feet, or 99.1 acres exclusive of pile piers, but including the filled portion of the Commonwealth pier, 4,662,234 square feet, or 107.2 acres; of this area, 792,287 square feet, or 18.2 acres, is under lease. The area southerly of Summer Street, exclusive of streets, is 1,917,347 square feet, or 44 acres, of which 88,221 square feet, or 2 acres, is under lease, and 304,560 square feet, together with 47,000 square feet in two cross streets, or 8.1 acres in all, is used temporarily as a public playground, under authority of chapter 421 of the Acts of 1891.

The lease from the Commonwealth to Curran & Burton, dated June 15, 1900, of 267,320 square feet of land and two pile piers, northerly of Summer Street, has been renewed for a period of ten years from Oct. 1, 1905, in accordance with the option contained in the original lease.

No new sales or leases of these lands were made during the year.

The sewers, drains and streets have been maintained, and the filling of the various lots to the required grade has been carried on by free dumping of selected material suitable for making a hard and firm surface.

Commonwealth Pier.

Under authority of chapter 513 of the Acts of 1897, the Commonwealth has built a pier on its property at South Boston, 1,200 feet long and 400 feet wide, with a dock on the westerly side 175 feet wide at the outer end, 200 feet at the inner end and 30 feet deep at mean low water. There is also a berth at the outer end of this pier, having the same

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depth as the dock. The total cost of this pier to Dec. 1, 1905, is $381,877.09, paid from an appropriation of $400,000 made by the act of 1897 aforesaid.

The use of this pier has been limited thus far by reason of delay in constructing Northern Avenue and bridge, which eventually will bring it into direct communication with the city proper. As the construction of this bridge and avenue is now assured, it is expected that the Commonwealth will soon receive a return from its investment.

The sum of $230 has been collected and paid into the treasury of the Commonwealth during the year for the use by vessels of the dock on the westerly side of the pier.

Northern Avenue and Bridge.

Under the provisions of chapter 381 of the Acts of 1903, authorizing the laying out and construction of Northern Avenue and bridge across Fort Point Channel and the land of the New England Railroad Company, the Boston Wharf Company and of the Commonwealth at South Boston, the State is required to pay to the city of Boston from time to time, as the work progresses, upon the order of this Board, the sum of $260,000.

General plans for this bridge, providing for two draw openings, each not less than 75 feet wide, were approved by the Board on July 18, 1904, and by the Secretary of War on April 11, 1905, after hearing before the United States engineer officer in charge of river and harbor work in this district, whereof a full statement appears in the report of the Board for 1904, pages 19–26. Detail plans of construction were approved by the Board on Aug. 25, 1905, and the city of Boston has entered into a contract for an abutment and piers, which requires the completion of that work by November, 1906. It is expected that the bridge will be fully completed in the year 1907, and with Northern Avenue will give direct access to the lands of the Commonwealth and to the Commonwealth pier.

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The Commonwealth's Flats at East Boston.

This tract of land and flats is located at and near Jeffries Point in East Boston, and was purchased and taken by the Commonwealth under authority of chapter 486 of the Acts of 1897, the appropriation therefor being $100,000.

The question involving the title of the East Boston Company, the largest owner, to certain of these flats taken as aforesaid, is still pending in the Land Court, under the charge of the Attorney-General.

The total amount expended on account of this property to Dec. 1, 1905, is $25,138.79.

Fort Point Channel.

The mid-channel originally had a depth of 16 feet at its mouth and an average of 12 feet thence to Federal Street bridge. The Congress in 1886 authorized dredging a channel 175 feet wide and 23 feet deep at mean low water, about 4,200 feet long, to a point near Federal Street bridge, at an estimated cost of $100,000. But a small portion of this sum, however, has been expended, to wit, $18,027, by reason of the obstruction presented by the old New England Railroad bridge. Although that obstruction was removed in 1898, no further sum has been expended in the furtherance of this project.

As a consequence, the channel has proved inadequate for steamships navigating that thoroughfare; and this Board has been called upon at various times to improve the channel by dredging, for the purpose of enabling vessels to approach the wharves to which they were destined.

The commerce which navigates this channel terminating in South Bay has increased until it is now claimed to be annually greater than that which enters the harbor of Portland.

Under these circumstances, this Board has seen fit to present the situation to the Federal government, and urge resumption of work in carrying out the original project. Meanwhile, the pressure for dredging in special localities has induced the Board, without waiting for the action of Con-

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gress, to dredge an area of 96,000 square feet to the depth of 18 feet at mean low water above Congress Street bridge, whereby 14,204 cubic yards of material were removed under contract, at a cost of 29 cents per cubic yard, in August; and later, in November, to execute a contract for dredging another area between Mount Washington Avenue and Federal Street bridges, of 52,000 square feet, to a depth of 16 feet, for 29 cents per cubic yard.

These two improvements by the Commonwealth, though inadequate, will temporarily relieve the situation, and also more than compensate for any shoaling caused by dumping snow and ice. An examination made in June, upon complaint of shoaling in the channel, showed that a small proportion only was caused by the dirt mixed with snow and ice dumped during the winter, but that the greater elements were clay, coal and coal dust, cinders and ashes carelessly and unlawfully deposited, either deliberately or in process of doing other work.

The total amount expended during the year was $4,263.96, paid from the income of the harbor compensation fund.

South Bay.

No substantial amount of work has been done under a contract entered into with the Roxbury Central Wharf Company, April 8, 1904, for dredging a channel across the southerly end of the bay, in extension of the channel dredged by the Commonwealth in 1902, about 375 feet long, 110 feet wide on the bottom and 12 feet deep at mean low water, and which calls for the expenditure of $8,000; but it is anticipated that the work will be completed during the coming season.

The total amount expended from the "Improvement of South Bay in the city of Boston fund," created by chapter 278 of the Acts of 1898, to Dec. 1, 1905, is $49,341.24. The balance in this fund Nov. 30, 1905, was $10,096.26.

Charles River.

In March complaint was received from the Boston & Maine Railroad that a ledge located on the edge of the channel of Charles River, about opposite the westerly end of the draw

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pier on the upper side of its southern division passenger bridge, had become an obstruction to the safe passage of vessels, owing to the change made in the draw-way in its freight bridge which had been rebuilt in accordance with requirements of the Charles River basin act, chapter 465, Acts of 1903.

The most direct and natural line between the draw-ways of the two bridges now lies directly over the summit of the ledge. Also, owing to the change in the freight bridge, it has become necessary to dredge an entirely new channel to the berth at the coal pockets of the railroad company at the Cambridge shore between the two bridges. In order to reach this channel it is necessary to make a sharp turn around the ledge, and in this case also the most direct track for vessels would be directly over the location of the ledge.

For the purpose of determining the extent of the obstruction, a survey was made of the ledge during the month of April, and there was found a depth of only 8.3 feet of water over it at mean low tide. The removal of the ledge to the depth of 18 feet at mean low water, which would accommodate practically all the vessels likely to navigate the river, would require the excavation of 1,170 cubic yards of ledge, and in addition a small amount of sand and gravel.

Copies of the plan of the survey were sent to the Boston & Maine Railroad and the Charles River Basin Commission.

The cost of this survey, amounting to $91.80, was paid from the appropriation for survey and improvement of harbors.

Jeffries Point.

By chapter 463 of the Acts of 1905 the Board was directed to dredge a channel in the flats near Jeffries Point, contingent upon the performance of a condition by the owners of land adjacent. The contingency not having arisen, the dredging has not been done.

Stony Beach, Hull.

By chapter 253 of the Acts of 1905 an appropriation of $1,500 was made, to be used in addition to the unexpended balance of $1,647.15 appropriated by chapter 483 of the Acts

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of 1901, for extending and completing the sea wall at Stony Beach, in Hull. This wall was constructed to prevent the sea from breaking through the ridge of beach connecting Point Allerton with the village of Hull, and preventing the sea from cutting off access to the village from the neck of main land.

It was found upon examination that a short section of the westerly end of the wall built in 1901 had been undermined and broken off; and on Aug. 25, 1905, a contract was entered into with William L. Miller, the lowest bidder, to remove the broken end of the wall and build an extension about 300 feet long, with two spur jetties, each about 50 feet long, from the end of the wall built in 1901 to a connection with the stone riprap protecting the embankment of the New York, New Haven & Hartford Railroad built along the beach at this point. The contract price was $8.23 per lineal foot of sea wall, and $3.52 per lineal foot of spur jetty. This work was completed Oct. 18, 1905, at a cost of $2,728.82.

The beach in front of the portion of the wall built in 1901 has been strengthened by the wash of sand and pebbles filling the old bays between the spur jetties for about one-half the length of the wall toward the easterly end. The new wall built this year extends 4 feet deeper than the portion of the old wall adjacent to it, and its westerly end is thoroughly protected by the riprap of the railroad, so that there is very little probability that it will ever be undermined or disturbed.

The total amount expended at Stony Beach, Hull, to Dec. 1, 1905, is $10,662.93.

Weymouth Fore River and Town River.

By the river and harbor act of Congress, approved March 3, 1905, $57,500 was appropriated for dredging Weymouth Fore River below Quincy Point, upon the condition that the Commonwealth or other parties should assume the maintenance of the improvements made in the river above Quincy Point and the improvement made in Town River, without further expense to the United States other than the sums already provided.

The Commonwealth, by chapter 103 of the Resolves of

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1905, assumed the responsibility of complying with this condition. The work of improving the channel by the Federal authorities has been in progress during the latter part of the season.

The Congressional appropriations already available were sufficient to complete the projected improvement of Town River and the re-dredging of the portions previously dredged, so as to leave the whole project in satisfactory condition.

In Fore River the Federal funds available were only sufficient to complete the dredging in accordance with the existing project, and in addition to barely commence re-dredging the channel previously dredged, which had filled in.

The cost of completing the re-dredging, if required by the Secretary of War in order to make the improvement conform to the project as estimated by the United States Engineers, would be about $16,653. Whenever a demand for deeper water in the upper reaches of the Fore River shall be made, the condition of the resolve would seem to require the Legislature to make an appropriation for the necessary dredging.

The lower reaches of Weymouth Fore River have been improved by the Commonwealth, as stated in the report of the Board for 1904, page 13, under an appropriation of $25,000 made by chapter 440 of the Acts of 1903, the total expenditure therefor to Dec. 1, 1905, being $10,235.87. No dredging has been done by the Commonwealth in Town River.

Land for Naval Magazine.

By chapter 446 of the Acts of 1905 the consent of the Commonwealth is granted for the acquisition, by purchase or condemnation, by the United States, of lands situated in the towns of Hingham and Weymouth, lying on both sides of and in the bed of Weymouth Back River, containing about 1,100 acres, to be described in a plan or plans to be approved by the Harbor and Land Commissioners, and to be used for the purposes of a naval magazine and for other purposes of national defence.

The approval of the Board was given on Sept. 25, 1905, and the plan entitled "Plan of lands at Hingham and Weymouth, Mass., to be acquired by the United States of America

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as the Site for a Naval Magazine under Act of Congress approved March 3, 1903, Scale 1: 2500 June 1905," is on file in the office of the Secretary of the Commonwealth.

Hangman's Island.

On Jan. 1, 1905, the Board leased to William J. Greenfield, one of the former lessees, Hangman's Island, in Boston harbor, for a term of three years from that date, the annual rental being $50. It is well to have fishermen continue to occupy this island, as they have been helpful from time to time as life-savers.

Revere Breakwater.

By chapter 108 of the Resolves of 1905 the Board was instructed to build a breakwater north of Cherry Island bar and east of Eliot Circle in the town of Revere, of such size and character as to provide a safe anchorage for yachts and to protect the shore property from damage by the sea.

After a number of inquiries and visits to the locality, and a conference with residents of Revere at the office in August, a survey was made of the locality. It was found that a breakwater extending north from what is known as Half Tide Rock, which is located just north of the bar and about half way between the shore and the outer end of the bar, which could be built for the appropriation, would afford but slight protection for an anchorage ground; and the area protected would not, in the opinion of the Board, be large enough to justify the construction of the breakwater, nor would the shore property receive much if any benefit, and might be injured.

Plans were then made for a breakwater which would afford protection over an anchorage area of 900 by 600 feet, having a depth of from 6 to 7 feet at mean low water, with incidental protection to shore property from damage by the sea. The cost of this was estimated to be not less than $55,000. This estimated cost exceeded the appropriation by $30,000. The resolve provides that any expense necessary for the complete construction of a breakwater after the expenditure of the money hereby appropriated shall be incurred and borne

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by the town of Revere or the citizens thereof. A communication was addressed to the selectmen of the town, stating that so soon as the Board is informed that the town or its citizens appropriated and made available for use the additional sum of $30,000, immediate action would be taken in furtherance of the project. No reply has been received to date.

Inasmuch as the Board felt unauthorized to expend any of the appropriation unless it was sure of being able to fulfill the intent of the Legislature to secure the completion of a project toward which it intended to apply only the sum of $25,000, no obligation has yet been incurred.

Saugus River.

By chapter 27 of the Resolves of 1905 the Board was directed to make a survey of Saugus River between the Salem turnpike and Broad Sound and report thereon, together with estimates of the cost of dredging a channel to such depth and width as the Board may deem advisable.

A survey was made in accordance with the provisions of the resolve, together with an estimate of the cost.

The field work was done between June 19 and August 21. A plane table survey was made of the shore lines and bridges on a scale of 1 to 2,000, and soundings taken covering the whole width of the river from Salem turnpike to the Point of Pines and out across the bay to the deep water of Broad Sound, covering a width of about half a mile. The river from the turnpike to the Boston & Maine Railroad bridge, a distance of about half a mile, has an average width of 600 to 700 feet between the banks; below, as far as its mouth at the Point of Pines, it averages nearly 1,200 feet between the banks. The low-water channel averages about 500 feet in width from Salem turnpike to its junction with Pines River, about midway between the Boston & Maine and the Boston, Revere Beach & Lynn Railroad bridges.

The channel depth in this section is a little over 4 feet at mean low water, except where it has been dredged to a greater depth. At the present time the dredged channel extends from the junction of Pines River to the works of the General Electric Company, and has a depth of about 10 feet at

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mean low water. The berth at the Electric Company's wharf has a depth of about 14 feet at mean low water.

Below the junction with Pines River to a point about half a mile below the wharf at the Point of Pines the channel widens, varying from about 400 to 600 feet, with a depth of from 7 to 20 feet at mean low water. Below this point the channel extends through the open bay to the deep water of Broad Sound.

Two sections of this channel were dredged by the United States government to 8 feet at mean low water for a width of 150 feet. Both these sections have since shoaled, so that there is now but 6 feet at mean low water over the bar, which is a little more than a mile below the Point of Pines.

At a conference with the representatives of owners of property bordering on the river, it was stated by those representing the General Electric Company, who at the present time are practically the only parties having vessels coming up the river, that a depth of 12 feet at mean low water will accommodate all the vessels which would be likely to navigate the river, the principal business now being the transportation of coal.

In order to accomplish this result, two estimates have been prepared, one for a channel 12 feet deep all the way from Broad Sound to the Salem turnpike, and the other 15 feet deep from the open bay to the mouth of the river at the Point of Pines, and 12 feet deep the balance of the way, as it seemed that the channel through the open bay was much more liable to silt up and reduce the depth than a channel in the river itself. Also, the waves in the open bay would cause vessels to pitch at times to a greater or less extent, and in order to prevent the vessels touching bottom, more depth would be required than in the still waters of the river. The width of the channel in each estimate is the same, being 200 feet on the bottom from the Point of Pines to the sea, and flaring out to about 400 feet in the last 2,000 feet. From the Point of Pines to the new highway bridge at the mouth of the river the width gradually narrows from 200 to 100 feet at the bridge. Between the highway bridge and the Boston, Revere Beach & Lynn Railroad bridge the width is again reduced to

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75 feet, as in this section vessels will be continually alongside the draw piers of the bridges. Above this railroad bridge it widens again to 100 feet, and continues at this width to the Salem turnpike.

The amount of material to be excavated under these two projects is as follows: —

	12 Feet (cu. yds.).	15 and 12 Feet (cu. yds.).
In the portion of the channel from the Point of Pines to Broad Sound,	180,000	360,000
Portion of channel above Point of Pines,	108,000	108,000
	288,000	468,000

The river is crossed by three bridges: two, the State highway or parkway bridge and the Boston, Revere Beach & Lynn Railroad bridge, being between the Point of Pines and the mouth of Pines River; and one, the Boston & Maine Railroad bridge, just above the mouth of Pines River.

The highway bridge is a double-leaf Bascule draw, with a clear opening of 50 feet. The Boston, Revere Beach & Lynn Railroad bridge has a revolving turn-table draw, with a clear opening of 37 feet, which is probably wide enough for the present. The Boston & Maine Railroad bridge has a jackknife draw, with a clear opening of 34 feet, which should be rebuilt when the channel is improved.

The estimated cost of excavating the channels is as follows: —

For channel 12 feet deep throughout its length: —	
288,000 cubic yards, at 25 cents,	$72,000 00
Supervision and contingencies,	5,000 00
	$77,000 00
For channel 15 feet deep from Point of Pines to sea and 12 feet deep above: —	
468,000 cubic yards, at 25 cents,	$117,000 00
Supervision and contingencies,	8,000 00
	$125,000 00

These estimates are based upon the scheme of excavating the material and towing it to sea.

The very considerable and growing commerce which would

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navigate a channel enlarged in accordance with this project would seem to recommend it as being worthy of improvement by the Federal government.

Out of the appropriation of $1,000 there has been expended to Dec. 1, 1905, $638.53.

Bass River, Beverly.

The dredging of the channel in Bass River at Beverly under chapter 341 of the Acts of 1903, which was commenced in 1904 under a contract with Charles H. Souther and John H. Gerrish, was completed Dec. 1, 1905. This channel is 6,600 feet long, 100 feet wide on the bottom, except through the ledge in the upper portion of the river, where the width is reduced to 75 feet, and 9 feet deep at mean low water, and enables vessels to reach the coal and lumber wharves in Beverly and the new wharf of the United Shoe Machinery Company.

The Commonwealth appropriated $25,000 toward the cost of the work, which has been expended. The balance of cost, $55,535.75, is the amount to be borne by the city of Beverly, of which there has been paid to Dec. 1, 1905, the sum of $43,736.08.

The total cost of the work is as follows: —

Earth excavation,	$67,041 54
Rock excavation,	10,989 60
Surveys and incidental expenses, including $539.81 paid for preliminary survey from appropriation for survey and improvement of harbors,	3,044 42
Total,	$81,075 56

Of this amount there has been expended to Dec. 1, 1905, $69,275.89.

Danvers River.

On June 1, 1905, a petition was received from the county commissioners of Essex County for the approval of plans and specifications for a bridge and approaches across Danvers River, between Salem and Beverly, as authorized by chapter 371 of the Acts of 1903.

The provisions in section 3 of the act, that "no money

shall be expended until the plans and specifications for the bridge and its approaches have been approved by the board of harbor and land commissioners," required of the Board something more than the approval of plans; so that after a public hearing, at which was developed wide and earnest concern as to the location and the approaches, a personal examination was made of the locality and surroundings. At a later date, to wit, Oct. 30, 1905, the county commissioners presented modified plans, containing a change in location of bridge and approaches, which were, on Nov. 24, 1905, approved. The draw will have a clear opening of 50 feet.

Annisquam River.

Chapter 88 of the Resolves of 1904 authorized the excavation of a channel in the upper portion of Annisquam River, 50 feet wide and 6 feet deep at mean low water, from Wolf Hill to Gloucester harbor, according to a plan made by the Board under the provisions of chapter 71 of the Resolves of 1903, at an expense of not more than $50,000, of which sum not more than $17,000 shall be expended in any one year. To carry out this project, releases have been secured from all but one of the abutting property owners, and the Boston & Maine Railroad has signified its willingness to make the necessary changes in its bridge.

The plans and specifications for the new bridge at Western Avenue, to be built by the county commissioners of Essex County over the "canal" at the southerly end of the proposed channel, under authority of chapter 254 of the Acts of 1905, were finally approved, in conference with the county commissioners, on Nov. 20, 1905.

Upon information that the city of Gloucester is preparing to acquire for park purposes the eastern bank of the canal which forms a portion of the proposed channel, including as part of the taking the area whose owner has not given a release to the Commonwealth, the Board is awaiting the result.

Presumably all necessary action may be taken during the winter, so that the work on the channel may commence early in the spring.

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The total amount expended on this project to Dec. 1, 1905, is $1,399.28.

Connecticut River.

By chapter 344 of the Acts of 1885 this Board was given the general care and supervision of the Connecticut River and its banks and of all structures therein, to prevent and remove unauthorized encroachments and causes of every kind which may in any way injure the river, and to protect and develop the rights and property of the public therein.

Hatfield. — The dikes constructed in 1904 on the banks of the Connecticut River in the town of Hatfield under chapter 82 of the Resolves of 1903 are efficient, and prevent the river at high water from flowing across the meadows, where it was feared it might cut through and make a new channel.

During the summer, in order to prevent the river at times of high water from flowing in upon the upper side of the dikes built in 1904, where it was liable to create eddies and do damage, a dike with culvert and swinging gate was built across the mouth of the ditch or drain just north of the dikes previously built. As this dike was to be 12 feet high, and would have to withstand the pressure of water nearly its full height, it was constructed with a core of cement concrete. The outer or river face of the dike was protected by stone riprap, and the bottom and sides of the ditch at each end of the culvert through the dike were protected by stone paving grouted with cement mortar.

The work was done under contract with Daniel O'Connell's Sons of Holyoke, the lowest bidders. The money was available from the balance of the appropriation of $7,500 made in 1903, of which the sum of $2,389.76 remained unexpended. A petition of the inhabitants of the town, requesting that the dike should be built, was filed with the Board. The total cost of the work, including surveys and supervision, was $1,590.51. These dikes have been transferred to the town of Hatfield for care and maintenance.

The total amount expended at Hatfield to Dec. 1, 1905, is $6,700.75.

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Hadley. — In the early summer, at the request of the selectmen of Hadley, an examination was made of the riprapping of the river bank on the upper side of the village of Hadley. A portion of the bank which was riprapped in 1888–1889 was graded quite steep, and along the summer water line the brush rotted out and the water undermined the stone, which in places had slipped down, thus removing the protection to portions of the bank.

Some of the riprap was replaced in 1904 and the gaps filled in, thus affording an efficient protection. This summer additional places were found to have caved in, but not to such an extent as to require immediate attention, and it seemed best to let the bank remain another year before undertaking further repairs. It will probably be necessary to do additional work on this section the coming year.

The total amount expended at Hadley to Dec. 1, 1905, is $60,864.41.

West Springfield. — In West Springfield, at Riverdale, the river has been for some time undermining and wearing away a portion of the natural bank. A shore owner had heretofore riprapped about 50 feet at considerable expense. There was danger of a continuance of the injury. A chance for securing a large amount of stone suitable for riprapping at a very low cost presented itself, and the Board, in co-operation with the shore owner, took advantage of the opportunity. The work was done under the supervision of the engineer and to the satisfaction of the Board, and will probably save a much larger expenditure.

About 250 lineal feet of the river bank were thus protected, extending from above the highest flood level to below the low-water level of the river. The total cost of this work to the Commonwealth was $135.

The total amount expended at West Springfield to Dec. 1, 1905, is $5,051.49.

Agawam. — The willows along the bank of the river in the town of Agawam have grown up so that they have begun to obstruct the view of the river from the highway and are complained of as breeding mosquitoes. It seemed to the Board, however, that these willows had not at the present

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time grown sufficiently to need cutting, and that they would more effectually prevent the washing of the bank if allowed to grow a year or two longer.

The total amount expended in protecting the river bank at Agawam to Dec. 1, 1905, is $8,005.76.

The total amount expended to Dec. 1, 1905, in protecting the Connecticut River banks in Hatfield, Hadley, West Springfield and Agawam, is $80,622.41.

Under the authority given the Board by chapter 58 of the Resolves of 1902, four of the scows used in riprapping the river bank were sold to the Boston & Maine Railroad for the sum of $189, which was paid into the treasury. Two of the scows still remain stored at Hadley. They were used in 1904 for repairing the riprap work, and will probably be required for similar work in the future.

Green Harbor.

By chapter 393 of the Acts of 1904 an appropriation of $10,000 was made for dredging at Green Harbor in the town of Marshfield. There has been no expenditure from this appropriation, as the Board is still of the opinion expressed in its report for 1904, page 33, that it is inadvisable to contract for the dredging until both jetties have been built up, and under the terms of the act it does not feel authorized to spend any of the appropriation to rebuild or repair the jetties. It is estimated that a proper building up of the jetties would cost not less than $15,000.

The total amount expended for the construction of stone jetties, for dredging, etc., to improve this harbor since beginning work in 1898, to Dec. 1, 1905, is $65,961.42.

Scituate.

As it appears in the report of the Board for 1902, out of the appropriation of $15,000 for protecting the shores and harbor of the town of Scituate, the sum of $12,189.03 was expended in building 2,448 feet of sea wall.

In December, 1904, John B. Damon made a claim for damages to his property by building the wall on the crest of the beach lying between Damons Island and The Glades at

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North Scituate. The Board, believing that his property had received a substantial benefit by the building of the wall, declined to award damages. A suit was brought, and he recovered a verdict of $3,833.83 from a Plymouth County jury. Subsequently a settlement was made through the office of the Attorney-General by the payment of $2,000 in full satisfaction.

Stage Harbor, Chatham.

By chapter 47 of the Resolves of 1903 the Board was authorized to build a timber dike and structures to close the breach at the eastern end of Stage harbor in Chatham, to protect the harbor from encroachments or damage by the sea, and an appropriation of $5,000 was made therefor.

By chapter 90 of the Resolves of 1904 $1,000 additional was appropriated, the first appropriation having been found insufficient for doing the work.

In 1904, owing to changes which had occurred in the outer beach, and at the request of inhabitants of the town, the Board decided to delay the construction of the dike.

In the spring of 1905, the outer beach at Chatham meanwhile having been broken through by the sea at a point nearly opposite the passage into Stage harbor, it was decided that the structures were absolutely required; and on June 27 a contract was entered into with Joseph J. Callahan, the lowest bidder, to build them as originally designed.

After the work was commenced it was found that the changes which had been and were taking place were of such a nature that it was necessary to extend the dike further across the marsh. Later, during the construction of the dike across the main portion of the passage, so much sand was washed out by the current that in order to protect the timber from the worms it was found necessary to bank the timber work with sand up to the low-water level. The rapid changes in the sand caused by the action of the sea through the break in the outer beach necessitated additional construction, in order to preserve the harbor and render effective the original project.

This unforeseeable additional work made the total cost ex-

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ceed the amount of the appropriation by $1,475.37, which will be paid from the appropriation for the survey and improvement of harbors. All of the work at this harbor has been completed at a total cost of $7,475.37, of which there has been paid to Dec. 1, 1905, the sum of $6,051.13.

Lewis Bay.

In 1899 surveys and examinations were made of Lewis Bay in the towns of Barnstable and Yarmouth, also estimates of the cost of improving the channels leading from Hyannis harbor into the bay and up to the landing at the Hyannis Yacht Club house. By chapter 194 of the Acts of 1900 an appropriation of $12,500 was made for dredging a channel 6 feet deep at mean low water through the bay to the yacht club landing. This channel was excavated during that year, and by chapter 395 of the Acts of 1905 an appropriation of $3,000 was made for dredging a channel across the bar in the eastern end of the bay.

This latter work was advertised in connection with the project for the improvement of Witchmere harbor and Paskamansett River; and on Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company for excavating the channel, the contract price being 40 cents per cubic yard, the total amount to be paid not to exceed $3,000.

As the work progressed it was found that, owing to unauthorized changes in the United States bench marks, with reference to which surveys for estimates were made, the amount of material to be excavated largely exceeded the original estimates; and, in order to dredge the channel as required, it became necessary to excavate the additional amount of about 2,000 cubic yards, at an extra cost of $650.

The cost of this work when completed will be as follows: —

Excavation done by the dredging company, . . .	$3,650 00
Surveys and superintendence, ...	90 94
Total, ...	$3,740 94

The total amount expended for the improvement of Lewis Bay to Dec. 1, 1905, is $13,319.72.

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Herring River.

By chapter 399 of the Acts of 1905 the Board was authorized to dredge the mouth of Herring River in the town of Harwich, to protect the same by jetties and otherwise improve the entrance.

An appropriation of $10,000 was made for carrying out the provisions of this act, it being provided that before the work was commenced the sum of $2,000 should be deposited with the Treasurer of the Commonwealth by the town of Harwich or its citizens, to be expended by the Board in addition to the $10,000 appropriated as aforesaid.

On June 16, 1905, the sum of $2,000 was deposited.

An examination was made of the mouth of the river in 1901, under the provisions of chapter 66 of the Resolves of that year, also a report and estimate of the cost of improving the same by dredging a new outlet 3 feet deep at mean low water, and protecting the same by stone jetties extending out to deep water in Nantucket Sound. The cost of this improvement was estimated from $35,300 to $59,100, the lower price being for timber jetties and the larger for stone jetties.

The appropriation made in 1905 being inadequate for carrying out the project as outlined, a survey was made to determine the changes which had taken place since the survey of 1901. It developed that the outlet had moved about 400 feet easterly, and that the entrance channel was much more difficult to navigate than in 1901. There had been no material change in the portion of the beach where it was proposed to create the new entrance in 1901, and plans were made for the construction of two stone jetties much shorter than those originally designed; for the excavation of a new channel through the beach, 75 feet wide on the bottom, to the level of mean low water; for riprapping its banks with stone; and for constructing an embankment or dike across the old outlet, so that the river would be turned into the new outlet through which it should scour a straight channel at least as large as the existing one.

The work, so far as planned, is of a permanent nature, and will prevent the mouth of the river from shifting in the

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future, and the jetties will prevent the waves from driving the sand into the mouth of the river. It will also enable the full force of the current to be utilized in enlarging and deepening the channel.

On July 27, 1905, a contract was entered into with Thomas & Connor, the lowest bidders, for building the jetties and excavating the channel, the contract price being $2.33 per ton for stone placed in the jetties and riprap, and $840 for the excavation of the channel through the beach to low-water mark. This work is now completed.

During the summer the old channel shifted quite materially, cutting into the beach on the easterly side of the entrance and also the high bluff further east. This created a low spot in the beach, over which the tide flowed at high water. In order to close this and turn the full volume of the tide through the new entrance, a low sand dike was built across this low spot, at an extra expense of $40. It is too early as yet to express an opinion as to how large an entrance channel will be created by the improvement, but the Board is satisfied that the availability of the river as a harbor for small boats will be materially enhanced.

The cost of work done during the year is as follows: —

For work under contract, ...	$11,141 02
For surveys, supervision and incidental expenses, . .	637 42
Total, ...	$11,778 44

The total amount expended at Herring River to Dec. 1, 1905, is $10,297.27.

Witchmere Harbor.

This harbor, located at Harwichport, was improved by the construction of jetties under authority of chapter 463 of the Acts of 1899, the total amount expended by the Commonwealth to Dec. 1, 1904, being $4,975.46.

By chapter 91 of the Resolves of 1904 the sum of $3,500 was appropriated for improving Witchmere harbor, by dredging the channel and in such other manner as may be deemed best; provided, however, that the town of Harwich or the

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citizens thereof should deposit not less than $500 with the Treasurer of the Commonwealth to complete the same.

A survey was made in June, 1904, and it was estimated that the cost of excavating the channel would be not less than $4,000. On Sept. 1, 1904, the Board was informed by the State Treasurer that $500 had been deposited with him by the town of Harwich under the above resolve.

The Board endeavored to make a contract for excavating the channel, but was unable to do so until it advertised the work in connection with the improvements at Lewis Bay and Paskamansett River, authorized by the Legislature of 1905. On Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company for dredging the entrance channel to this harbor, 40 feet wide, 5 feet deep at mean low water and about 1,150 feet long, for the sum of $3,825, the estimated amount of material to be excavated, *situ* measurement, being 10,000 cubic yards. This work was completed in a satisfactory manner, and in addition thereto the shoal within the harbor easterly of the westerly side line of the channel was also removed at an expense of $950, of which the Commonwealth paid $175 and the town the balance.

As sand was washing through between the large stones of the jetty on the westerly side of the entrance into the channel, arrangements were made for closing these interstices with concrete. Owing to the lateness of the season, this work could not be completed; but enough was done to close the openings through the lower portion of the jetty, through which the larger part of the sand was driven.

After the stone jetty was extended 150 feet in 1899, the beach to the westward built out to such an extent that large quantities of sea weed and some sand are constantly washing around the end of it into the channel. To prevent the continuance of this action, which will result in filling up and decreasing the depth of water in the channel, the stone jetty should be extended about 300 feet, substantially in the line of the portion built in 1899.

The cost of such an extension is estimated to be about $10,000.

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The cost of the work done during the year paid for by the Commonwealth is as follows: —

Excavating channel under contract,	$3,825 00
Extra dredging of shoal in harbor,	175 00
Work on stone jetty, and for advertising,	729 19
Total,	$4,729 19

The total amount expended for the improvement of this harbor to Dec. 1, 1905, is $8,823.96.

Bass River, Yarmouth.

In April a survey was made of the mouth of Bass River at Yarmouth. While considerable change had been made by the current during the past year, in general the depth and width of the channel had increased, so that the facilities for navigation were improved.

Owing to the scour of the current and the settling of the sand-bag embankment along the sides of the outer portion of the eastern jetty, that section of the jetty seemed to require a more substantial protection. On Dec. 1, 1904, a contract was made with Charles A. & Joseph J. Callahan to protect about 1,000 feet of the outer end with stone riprap. This work was completed Aug. 4, 1905, material to the amount of 1,838 tons having been deposited in place. The jetty is now protected in a thoroughly substantial manner from a level just above low-water mark to the bottom of the channel.

In addition to this work, about 50 tons of stone were placed at the inner end of the western jetty, to prevent the cutting away of the shore at the meeting point.

The cost of work done during the year is as follows: —

Stone riprap in eastern jetty,	$4,578 98
Riprap inner end of western jetty,	132 50
Supervision and incidental work,	373 07
Total,	$5,084 55

Of this amount, $5,034.62 was paid from the appropriation of $15,000 made by chapter 46 of the Resolves of 1903, and

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$49.93 from the appropriation for the survey and improvement of harbors.

The total amount expended in improving the entrance to this river to Dec. 1, 1905, is $37,129.68.

East Bay, Osterville.

Under authority of chapter 376 of the Acts of 1903 a channel was excavated through the beach from East Bay, located at Osterville in the town of Barnstable, to Nantucket Sound, two stone jetties built, the banks of the cut through the beach riprapped with stone, and the old outlet of the bay to the sound closed by a temporary dam, all at a total cost to Dec. 1, 1904, of $6,618.10.

The new channel opened in the spring of 1904 and the jetties protecting it are in good condition. A survey was made early in May and the depth on the bar was found to be nearly 3 feet at mean low tide. The sea had cut into the shore to the east of the easterly jetty to a dangerous extent, and was liable to break through the narrow beach. To meet the situation it is proposed to riprap this weak strip of the beach, about 150 feet, with stone taken from the outer end of the easterly jetty, at a cost of $250.

The flow of water through the old outlet, which broke down the temporary sand-bag dam built across it, has prevented the sea from closing up that mouth. But in order to close it in a substantial manner, so that all the current will flow through the new outlet, the Bay State Dredging Company is to build a sand embankment across it, for the sum of $600. The presence of a dredging machine in the vicinity enabled the Board to effect this arrangement at a low figure. This work will be done during the month of December, 1905.

No material change has taken place inside the bay, and the depth of water between the main portion thereof and the approach to the outlet is much less than in the outlet itself. It has, however, since construction saved many boats from shipwreck during several severe gales.

The total amount expended at East Bay to Dec. 1, 1905, is $6,649.52.

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West Bay, Osterville.

A survey was made of the channel through West Bay at Osterville during the spring, and it was found to be in good condition. The bar just inside the inner end of the jetties had been washed away to a considerable extent. There was a good depth of water in the channel on the easterly side of the bar and a fairly good depth on the westerly side.

It was stated that the westerly channel had been used quite extensively during the summer, and that, on the whole, the bar had offered but little obstruction to the use of the entrance.

Some of the planks in the jetties had become loosened, and were replaced and secured at an expense of $60.55.

The total amount expended at West Bay to Dec. 1, 1905, is $29,285.64.

New Bedford Harbor Line.

On Oct. 5, 1905, a petition was received from the Union Street Railway Company and the City Coal Company of New Bedford, asking the Board to take such action as will result in changing the harbor line in front of their wharves in New Bedford harbor, near the New Bedford and Fairhaven bridge.

Under the provisions of chapter 96 of the Revised Laws, section 14, the petitioners were ordered to publish notice of this application; and on Nov. 8, 1905, after due publication, a hearing was given, at which all parties interested had an opportunity to be heard. No one appeared in opposition.

The reasons advanced by the petitioners for the change in the present harbor line, which was established by chapter 269 of the Acts of 1848, were that the condition of the sea wall and foundation on the property of the street railway company requires that the same be rebuilt; that, owing to the deepening of the channel and berth in front of their wharves, and other changed conditions due to the construction of the Fairhaven bridge and other causes, it has become necessary to reconstruct the walls at the outer end of their wharves;

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that, owing to the narrow space between the outer ends of their wharves and the easterly ends of the large brick power houses on the wharf of the street railway company, it is practically impossible to reconstruct the walls within the existing harbor line; that, in order to make the necessary repairs without damage to their structures, the harbor line should be advanced from 8 to 10 feet.

From an examination of the locality it appears that formerly the main navigable channel of this portion of the harbor lay immediately in front of these wharves and between them and Fish Island, and over this channel the draw in the Fairhaven bridge was located. The space between the ends of the wharves and the island was too narrow to enable vessels to lie at the end of the wharves and leave a sufficient channel for navigation; consequently, it was decided at the time the bridge was rebuilt to place the draw eastward of Fish Island, a new navigable channel being dredged to conform to the new location of the draw. That portion of the bridge across the old channel having been built without a draw, the space in front of these wharves is now in the nature of a dock, there being no opportunity for vessels to pass up beyond these wharves.

The Board is of the opinion that there is sufficient reason for permitting the desired change in the harbor line, and that it will not interfere with public navigation.

While investigating this subject it was found that the harbor line immediately above the bridge might also be advanced, to conform to changed conditions and in substantial coincidence with the United States harbor line. The Board therefore reports this matter to the Legislature for action.

Paskamansett River.

By chapter 449 of the Acts of 1905 the Board was authorized to expend a sum not exceeding $2,000 in deepening and improving the entrance to Paskamansett River in the town of Dartmouth. A survey was made in June, 1905, and an examination of the locality made by the Board in July.

This river empties into a cove on the westerly side of Buz-

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zards Bay, between Mishaum Point and Barneys Joy Point. It has a channel 5 to 10 feet deep at mean low water, but its mouth is obstructed by a bar over which there is less than 3 feet at low tide. The beach to the southwest of the entrance is gradually working into the channel, and if a permanent improvement is to be created, a jetty should be built extending from this point in a southerly direction parallel with the general direction of the river channel.

The amount of the appropriation would not warrant the construction of such a jetty, but the dredging of a channel through the bar would give the immediate benefit desired. Consequently, it was decided to dredge across the bar in order to give passage between the bay and the deep channel in the river.

On Aug. 2, 1905, a contract was entered into with the Bay State Dredging Company to dredge a channel 150 feet wide, 5 feet deep at mean low water and about 400 feet long, through the bar at the mouth of the river, the contract price being 48 cents per cubic yard, with the provision that the cost of the whole work should not exceed $2,000, the amount of the appropriation. Presumably this work will be done during the month of December.

The total amount expended in connection with this improvement to Dec. 1, 1905, is $92.15.

Nashawena Island.

At the request of the Governor and Council a survey and examination of the harbor at the island of Nashawena were undertaken, and a plan and estimate made of the cost of improving it sufficiently to make a safe and practicable landing for vessels, such as would be required in connection with the use of the island as a prison site.

The natural harbor runs nearly east and west, with an entrance into Buzzards Bay towards the north, and it is entirely feasible to dredge a channel at the mouth and an inside area of ample capacity to a depth of 12 feet at mean low water.

The approach to the harbor is deep, the water shoaling

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quite rapidly at the entrance. The present wharf appears to be located in a favorable place, and will be made accessible by the excavation of a channel 12 feet deep at mean low water, 150 feet wide and about 1,500 feet long; opposite the wharf the channel may be widened to 200 feet.

To more fully protect this basin a breakwater or jetty should be built, extending out from the headland on the eastern side of the harbor over the shoal or bar for a distance of about 750 feet. The bar at the present time is so high as to afford fairly good protection, but that can be materially increased by the construction of a breakwater.

There is ample stone on the island in the vicinity of the harbor to construct this breakwater, and it is work admirably adapted to furnish occupation to a large number of men with a minimum use of machinery.

The outer portion of the channel is through a bed of gravel and stone, which, once excavated, will probably be very little affected by the action of the waves; while the inner portion of the channel, where there is a large amount of soft material, will be so protected by the bar and breakwater that the waves will not injure it.

This channel will give free access to the most convenient landing place on the island, and will require the excavation, including side slopes on angles of 1 on 2, of 64,400 cubic yards. Its cost is estimated as follows: —

64,400 cubic yards, at 40 cents, ...	$25,760 00
Surveys and supervision, ...	1,000 00
Total, ...	$26,760 00

The present wharf should be extended to the edge of the proposed channel, and enlarged. This extension, if constructed of masonry, could also be done by hand labor.

For preliminary temporary use a small pile structure can be built at the end of the present wharf, at an expense not exceeding $500, including the repair of the top of the existing wharf. The construction of the breakwater and of the permanent wharf can be delayed for a time, and if the island is to be used as a prison site, they can be easily constructed by

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the labor of the convicts; and for this reason no estimate of their cost has been made.

Plans and estimates of the proposed harbor improvement were prepared and sent to the Governor on Nov. 1, 1905.

Cuttyhunk.

Under chapter 33 of the Resolves of 1900 the Board made surveys and estimates for improving the harbor of Cuttyhunk in the town of Gosnold. Three plans for the improvement of the harbor were made, one for improving the existing entrance channel by building jetties and dredging, and the other two for building jetties and cutting new entrances into Cuttyhunk Pond through the beaches at the north and east sides of the pond. The estimated cost varied from $29,550 to $116,500.

By chapter 450 of the Acts of 1905 an appropriation of $5,000 was made for dredging and otherwise improving the harbor. The appropriation being too small to fully carry out either of the schemes reported in 1900, a survey was made of the existing entrance, and a plan prepared for building two stone jetties, one on either side of the entrance, to direct and confine the current over the bar and prevent the waves from driving sand and shingle into the narrow channel opposite the point of the north beach. Both jetties are to start from the crest of the beach, and at that elevation to extend a short distance, the balance and outer portion of each jetty to extend only to the level of high water, with a mound at the end, rising about 4 feet above ordinary high water, for the purpose of marking the entrance.

It was estimated that jetties of this description could be built within the appropriation. Stone of a class suitable for this work is very abundant on the island and along the shores of the pond, from which it can readily be taken and used for the construction of the jetty. Most of the stone is owned by the Cuttyhunk Club, and on September 4 the assent of the club was obtained for the Commonwealth to take the stone and use it for the construction of the jetty, thereby enabling the Board to use the appropriation to the best advantage.

Proposals were invited, and on Sept. 28, 1905, a contract

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was entered into with Joseph J. Callahan, the lowest bidder, to build the jetties, the contract price being $1.08 per ton of 2,000 pounds, the work to be completed June 1, 1906. Owing to the late date at which the contract was made, and to the fact that the contractor was already engaged in building a timber dike for the Commonwealth at Stage harbor in Chatham, it was decided not to begin work at Cuttyhunk until spring, which would leave ample time to do the work within the contract limit. During the winter the contractor will build the scows and plant necessary for vigorously prosecuting the work in the spring.

The total amount expended in connection with this harbor to Dec. 1, 1905, is $458.88.

Vineyard Haven Harbor.

Under authority of chapter 95 of the Resolves of 1904 the Board last year reported on plans for the improvement of Vineyard Haven harbor, to provide safe anchorage ground for small yachts and boats. By chapter 442 of the Acts of 1905 the Board was directed to construct a stone breakwater on the westerly side of the harbor north of the steamboat wharf, within the appropriation of $10,000, which is about one-half the estimated cost of a breakwater 1,200 feet long.

In order to obtain the greatest protection with an expenditure limited to the amount of the appropriation, plans were prepared for a breakwater about 700 feet long in the shoalest part of the location recommended in the report of the previous year; and on Sept. 8, 1905, a contract was entered into with E. S. Belden & Sons for its construction, the contract price being $1.40 per ton of 2,000 pounds. The breakwater is to be located on the shoal ground on the westerly side of the harbor, about opposite Arnoux's wharf. It is to be between 600 and 700 feet long, 5 feet wide on top, and to project about 2 feet above ordinary high water, the outer face sloping on an angle of 1 on 1½, the slope of the inner face to be steeper. The anchorage basin will vary in depth from 4 to 8 feet at mean low water.

Owing to other work the contractor had on hand, construction will be delayed until spring, but it is to be wholly

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completed on or before June 1, 1906, the date named in the contract.

The total amount expended in connection with this harbor to Dec. 1, 1905, is $253.80.

Lake Anthony, Cottage City.

No work has been done at this harbor except the completion of the dredging which was in progress at the end of last year under the provisions of chapter 416 of the Acts of 1904. The jetties require some repairs, which will be made the coming spring by filling in spaces between the large stones with cement concrete, to prevent the sand from washing through them and shoaling the channel. This work has to be done from time to time, as new openings are caused by the settlement of the stones forming the jetties. The total expense of the dredging for the year was $5,654.87.

The mooring buoys set by the Commonwealth are in good condition, having been taken up and painted by the harbor master during the spring.

The use of the harbor is growing yearly as a place of refuge and for anchorage, and the area increased by the last dredging accommodates a large number of yachtsmen, sailing parties and fishermen.

The total amount expended at Lake Anthony to Dec. 1, 1905, is $36,172.95.

Nantucket Harbor.

By chapter 451 of the Acts of 1905 the Board was authorized to improve the harbor of Nantucket by dredging in the channel between Brant Point and Hussey shoal, $5,000 being appropriated for the purpose.

Early in July, 1905, an examination was made by the Board, and later a survey was made of the northerly end of Hussey shoal and the channel between it and Brant Point. A plan was adopted for dredging the northerly end of the shoal so as to increase the width of the channel where vessels entering the harbor were likely to be carried into shoal water by the strong tide, especially when missing stays in beating against a head wind.

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On Aug. 25, 1905, a contract was entered into with the Morris & Cumings Dredging Company, the lowest bidder, to dredge an area from the northwest end of the shoal about 400 feet long and 300 feet wide, to the depth of 12 feet at mean low water, for the sum of 28 cents per cubic yard. This work was completed Oct. 18, 1905, and in addition a small amount of material was excavated from the easterly side of the channel opposite Brant Point. The improvement of this channel is a great benefit to the harbor.

In all 16,732 cubic yards of material were removed, the cost of the same being as follows: —

Contract work,	$4,684 96
Surveys and incidental work,	163 89
Total,	$4,848 85

The total amount expended for the improvement of this harbor to Dec. 1, 1905, is $5,226.11.

Wrecks and Obstructions.

Complaints regarding wrecks have been received by the Board, and action thereon taken, with results as follows: —

Wreck of schooner "Albert Harding" at the entrance to Pigeon Cove harbor in Rockport. Removed by the United States government.

Schooner "Chromo" wrecked at the entrance to Boston harbor, off Boston light. Removed by the United States government.

Sloop yacht "Gooshkeen" in Pleasure Bay at City Point, South Boston. Removed by the owner.

Wreck of schooner "Annie E. Lane" in Beverly harbor, near the draw of the Salem-Beverly bridge. Removed by the Board and sold to William M. Swasey of Salem. The net cost to the Commonwealth will be $225.

House boat "Charles McDonald" in Beverly harbor. Removed by the owner.

Wreck of small schooner in the channel of Quisset harbor in Falmouth. Removed by the Board at an expense of $25.

The total amount expended from the appropriation of $1,000 made by chapter 38 of the Acts of 1905, to Dec. 1, 1905, is $25.

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Fall River–Somerset Bridge.

The Railroad Commissioners, the Harbor and Land Commissioners and the County Commissioners of the county of Bristol were constituted a Joint Board by chapter 462 of the Acts of 1903, and directed to locate and construct a new drawbridge over Taunton Great River, between the city of Fall River and the town of Somerset, with the necessary approaches and ways thereto, at a cost not to exceed $1,000,000.

As stated in the report for 1904, page 76, plans for a bridge with a lift draw, having a clear passageway of 70 feet, to be located about 1,200 feet north of the existing Slades Ferry bridge, with the easterly terminus at Brightman Street in Fall River, were approved by this Board on May 2, 1904, and application made by the Joint Board to the Secretary of War for his approval of these plans.

A favorable report on the plans presented was made by the United States engineer officer in charge of the district where the bridge is to be built; but before final action upon the matter, at the instance of certain remonstrants, a special Board of three engineer officers was appointed by the Secretary of War to further investigate and report upon this project. They gave a public hearing in Fall River on April 14, 1905, at which members of the Joint Board and others, in favor, as well as those in opposition to the original plans submitted, were heard at length.

The report of this special Board was unfavorable, and notice was subsequently received from the acting Secretary of War that these plans failed to meet with approval.

A request will be made for a further hearing before the Secretary of War, asking for reconsideration of the subject, the Joint Board being unanimously of the opinion that the original site selected is the one where the bridge should be built, for the reasons following, to wit: that it will cost less; that it will afford the greatest convenience to the largest number of the public travelling on the highway and prevent the least obstruction to navigation, at the same time avoiding any curtailment of the harbor or interfering with

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the use of shore front adapted for wharves and docks. By this is meant that, balancing the several conveniences of the public travelling by land and the public using the water way, the site selected would be the least objectionable. If located above, its usefulness would be greatly impaired; if below, it would cost more and interfere with future water front development. The chief objection urged seems to be its inconvenience, or, as the remonstrants say, its danger to tows. This can be wholly obviated by limiting the tows to three vessels, and shortening up the tow lines.

Great Ponds.

By chapter 318 of the Acts of 1888 the Board was given jurisdiction over great ponds containing in their natural state more than 10 acres of land.

Numerous licenses have been granted from time to time, since the passage of this act, for the erection of structures and for building flumes and drawing water from great ponds for use in flowing cranberry bogs. The right of the Board to revoke a license for drawing water from a great pond containing a clause providing for its revocation in case certain conditions are not complied with, has recently been questioned, and the opinion of the Attorney-General has been requested.

It was stated in the report of the Board for 1902, page 46, that the Attorney-General had been requested to make claim to an island known as Loon or Snake Island in Chebacco Pond in Hamilton, believed to be occupied under claim of squatter right only, and that the matter was pending in his office. The Board was informed on Sept. 25, 1905, that the auditor before whom the case was tried had rendered a decision adverse to the Commonwealth, on the ground that, the town of Ipswich having been settled before 1647, and having at the time of its settlement become vested with the title to the lands and ponds within its limits, the effect of the ordinance of 1647, so far as great ponds were concerned, was merely to secure certain rights of enjoyment to the public, but not to take from the town the legal title. From which it appears that the substantial question to be decided is,

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whether the Commonwealth, as against an unlawful intruder, does or does not own an island in a great pond where there is nothing to defeat the title of the Commonwealth to the pond except the fact that it is situated within the limits of the town established and recognized by the colony before the passage of the colony ordinance of 1641–47.

The matter is pending before the Supreme Judicial Court on questions of law to be argued at the November sitting of the court.

Province Lands.

The reclamation of the territory belonging to the Commonwealth known as the Province Lands, located in Provincetown and containing about 3,290 acres, has been in progress under the direction of the Board since 1893. The method adopted for this work is the planting of beach grass, shrubs and trees to cover and hold the blowing sands, and has been fully described in previous reports of the Board.

By chapter 396 of the Acts of 1905 a further appropriation of $10,000 for the reclamation of these lands was made, one-third of the same to be expended in each of the three years after the passage of the act. About 270 acres have been covered with beach grass since the commencement of work of that character in the spring of 1895, leaving about 45 acres of barren sand dunes yet to be covered.

A road across this property to Race Point life-saving station, 10,200 feet in length, has been built under previous appropriations, at an expense of $3,450.

The sum of $142.52 has been received during the year from licenses which have been issued to various parties to cultivate and pick cranberry bogs on these lands.

The report of the superintendent of these lands may be found in the appendix.* The Department of Agriculture at Washington continues its interest in the reclamation of the sand barrens on the Cape.

The amount expended during the year was $3,430.64.

The total expenditure on these lands to Dec. 1, 1905, is $38,647.84.

* See Appendix B.

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Taxation of Forest Lands.

On May 15, 1905, the provisions of chapter 60 of the Resolves of 1905, relating to the appointment of a committee to consider the laws relative to the taxation of forest lands, were considered, and the chairman of this Board was chosen to act as a member of said committee.

Fall River.

In July, 1905, the Board, acting under authority of chapter 471 of the Acts of 1905, and with the approval of the Governor and Council, executed a deed to the Old Colony Street Railway Company of tide-water land in Mount Hope Bay in Fall River, described in License No. 2773, granted by the Board to said company July 29, 1903. The consideration named in the deed was $100, being in addition to the sum of $2,000 paid into the treasury of the Commonwealth by said company for rights and privileges granted in tide-water land of the Commonwealth by said license.

State Boundaries.

For the purpose of preserving and maintaining the monuments and marks on the State boundary lines, section 4 of chapter 1 of the Revised Laws requires that the Board of Harbor and Land Commissioners shall in the year 1905 and every fifth year thereafter examine and inspect all the monuments or other marks defining the location of the boundary lines of the Commonwealth; and if any of them have been injured, displaced, removed or lost, said commissioners shall, in co-operation with persons duly authorized by the adjoining State, restore them or replace them with suitable stone monuments, and in the same manner set suitable stone monuments at points not properly marked, where the State boundary is intersected by the boundary of any counties, cities or towns in the Commonwealth, or by a highway or railroad.

In order to defray the expense to be incurred in the performance of the foregoing duty, an appropriation of $1,500 was made by the last Legislature.

The Board, by correspondence with the executive depart-

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ments of the several adjoining States, arranged for a perambulation of the State boundaries with New Hampshire, Vermont and Connecticut. The State of Rhode Island failed to respond to the invitation. The State of New York perambulated its boundary line in 1902.

The result of the performance of the duties required by the statute is reported as follows: —

Boundary Line between Massachusetts and New Hampshire.

The boundary line between these two States remained unsettled for more than two hundred years. As long ago as 1693 efforts were made to fix the boundary line, but without success. Commissioners were appointed at various times in the eighteenth century, without being able to reach any agreement.

In the year 1740 the King in council ordered and adjudged "That the Northern Boundaries of the province of the Massachusetts Bay are and be a similar curved line Pursuing the course of the Merrimack River, at three miles distance, on the north side thereof, beginning at the Atlantic Ocean and ending at a point due north of a place in the plan returned by the said Commissioners, called Pawtucket Falls, and a strait line drawn from thence due west across the said river till it meets with His Majestys other Governments. . . ."

In March, 1741, George Mitchell was appointed to run the "similar curved line" from the ocean to the point north of Pawtucket Falls, and Richard Hazen to run the straight line due west. They both started from a pitch pine tree nearly 3 miles north of Pawtucket Falls, now Lowell, and thereafterwards known in the many commissioners' reports as the "Boundary Pine."

Far from settling the boundary, the result of this action created great dissatisfaction, and the many efforts to agree upon the line run by Mitchell and Hazen as the true boundary failed, until in 1885 commissioners were appointed by both States to jointly ascertain and re-mark the line as defined in 1740–41.

From the "Boundary Pine" at Lowell eastward to the

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sea these joint commissioners found monuments which they identified as marking the angles originally located in 1741, and ran lines connecting them.

From Lowell westward they agreed that the nearest approach to the line as originally run out was a series of straight lines connecting the existing town corner bounds, and so marked the line.

The boundary thus ascertained was established by the Legislature of Massachusetts, chapter 369 of the Acts of 1899; and by the Legislature of New Hampshire, chapter 115 of the Acts of 1901.

For the history of this boundary line see report of Commissioners to ascertain and establish the Boundary Line between Massachusetts and New Hampshire, Mass. House Doc. No. 490, 1889, and House Doc. No. 860, 1899; also, Bulletin No. 226 of the United States Geological Survey, upon boundaries of the United States and of the several States and Territories, 1904.

In September, 1905, authorized representatives of Massachusetts and New Hampshire met by appointment, and perambulated the boundary line between the two States. All the bounds were found to be in place and in good condition except No. 117, at the turnpike called Broadway, in Methuen. This bound apparently was not set deep enough, and was thrown out of plumb so as to lean about 12 inches from the vertical. Also, No. 132, at Hilldale Avenue, Haverhill, was in a similar condition, although at present it leans only about 5 inches out of the perpendicular.

These monuments have now been severally reset in their respective identical locations.

Boundary Line between Massachusetts and Vermont.

The boundary line between the Commonwealth and Vermont is a continuation of the line between New Hampshire and Massachusetts, which was run by Richard Hazen in 1741 from "Boundary Pine" on the New Hampshire line through to the Hudson River, and no contention has ever arisen as to its location.

The line, however, remained unmarked by monuments

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until the twentieth century, when, after a preliminary survey of the line between the northwest corner of Massachusetts and the Connecticut River, made to determine the relative position of the town corners and fences connecting the line of occupation between the States and such other monuments or points as might be used in aiding a final agreement, monuments were set and marked by commissioners representing both States as on the New Hampshire line.

The line was finally established by the Legislature of Massachusetts, chapter 131 of the Acts of 1900; and by the Legislature of Vermont, chapter 137 of the Acts of 1900.

For a history of this line see Mass. House Doc. No. 300, 1900.

A perambulation of this line was made in October, 1905, by authorized representatives of the Commonwealth and the State of Vermont, who duly met at an appointed time and place, and together visited and examined the monuments. All the bounds were found to be in place and in good condition, with the following exceptions: No. 9, at the corner of Bernardston, Guilford and Leyden, is very loosely set and easily shaken. It stands in swampy ground, and is liable to be forced further out of place. No. 31, at Jilson Hill, between the towns of Rowe and Whitingham, leans about 7 inches from the perpendicular toward the west and south. There are deep holes in the ground around the base of the monument, and it is liable to fall over still further. The ground around this monument is also soft and springy.

These monuments will be severally reset in their identical locations.

Boundary Line between Massachusetts and Rhode Island.

The charter of New Plymouth was obtained in 1629. Although it gave the colonists the highest prerogatives of sovereignty, yet, as it was not confirmed by the Crown, it failed to become a duly incorporated body politic, and so remained until 1691, when it was united with the Colony of Massachusetts.

Meantime, in 1663 a royal charter was granted to Rhode Island, which, encroaching upon the Plymouth patent, gave

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rise to disputes relative to the boundary line between Rhode Island and Massachusetts, which were not settled for over two hundred years.

Many commissioners were appointed and many reports made, and twice the differences were carried to the Supreme Court of the United States during this period of controversy.

The history of the differences and final settlement may be found in Mass. House Doc. No. 102 for the year 1861; in Sen. Doc. No. 34 for the year 1883; in the report of the Commissioners on the Topographical Survey, House Doc. No. 1230 for the year 1899; and in Bulletin No. 226 of the United States Geological Survey, 1904.

It is sufficient for the purpose of this report to say that the boundary line from Burnt Swamp corner west to the Connecticut line was finally established by Massachusetts, chapter 154 of the Acts of 1883, and Rhode Island, chapter 342 of the Acts of 1883; and that the boundary line between the Commonwealth and the State of Rhode Island from Burnt Swamp corner southerly to the sea was established by Massachusetts, chapter 476 of the Acts of 1899, and Rhode Island, chapter 683 of the Acts of 1899.

The whole of this boundary line has been delineated and fully marked by bounds and granite monuments. It has been perambulated by an authorized representative of the Commonwealth, not, however, in conjunction with an agent of the State of Rhode Island, as, although invited, none was appointed to pursue the work jointly.

All the marks along the eastern boundary of Rhode Island are in good condition except six. Two of these, Nos. 74 and 75, stand in meadow land near the banks of Runnins River, between East Providence and Seekonk. They are line stones, and are valuable as reference marks to the angle in Runnins River, where the line bends from a straight line and follows the middle of the river. The angle point is marked by an iron bolt set in the stones of the bridge, and will be destroyed whenever the bridge is rebuilt. The two stones are about 300 and 600 feet from the bridge, and at present are so loose that they can be easily shaken. These stones will be permanently reset in concrete.

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Nos. 97 and 98, in the line between Swansea and Warren, stand on the north and south sides of the New York, New Haven & Hartford Railroad. The railroad at this point crosses a meadow on quite a high embankment, and the monuments stand substantially on the two edges of the railroad location in the swampy ground. These stones will be reset so as to be firmly fixed.

No. 101, between Swansea and Warren, is a short distance north of the shore of Mount Hope Bay. It is a small stone, and is practically a reference bound to the large stone which stands on the shore just above high-water mark. At the present time it is loosely set, and leans 7 inches to the south. It will be permanently reset in concrete.

No. 104, between Fall River and Tiverton, on the easterly side of the location of the Newport branch of the New York, New Haven & Hartford Railroad, at the present time is entirely out of the ground, leaning against the bank on the southerly side of State Avenue, a street which follows the boundary line between Massachusetts and Rhode Island at this point. When the line was re-marked in 1898 the bound stood on the top of the bank, and is one of the original bounds which was not disturbed. Since that time the bound has apparently been undermined by the gradual wearing away of the embankment by the water which runs down that side of the ditch from the roadway. It will be reset at a lower grade in the identical location, substantially level with the surface of the present roadway.

Of the monuments marking the northern line of Rhode Island, all were in good condition except as follows: —

No. 26, which marks one of the angles of the line, is buried below the surface, and a new bound is placed on the opposite side of the street; undoubtedly the old bound can be dug up at any time when it is necessary to establish the exact location of the angle. The old bound, which originally projected above the surface, was probably broken off in order not to interfere with adjacent property.

Twelve of the bounds along the line, none of which are at angles, are almost wholly buried in the ground, and are difficult in most cases to find. Larger bounds, which would pro-

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ject 4 feet above the surface, will at some future date, in co-operation with the State of Rhode Island, be set alongside these small ones, so that the marks can be more readily found.

Boundary Line between Massachusetts and Connecticut.

The boundary between the province of Massachusetts and the colony of Connecticut has presented questions of conflicting interest from the settlement of the country down to a late date. After many efforts in the seventeenth century, and failure to reach agreements, memorials were forwarded to the King, asking the Crown to settle the disputed boundaries. Without, however, awaiting the action of the Crown, commissioners on the part of the two colonies were appointed in 1713, and made a report in 1714, which was accepted. Subsequently in 1734 a perambulating committee discovered that a mistake at the northwest corner of Woodstock had apparently been made in 1713. The discovery of this mistake caused endless misunderstandings and disagreements, which continued through the eighteenth century. An amicable settlement, however, was finally reached in 1826, when a report was agreed to by both States, and the long-continued controversy was terminated. (Resolves of Massachusetts, 1824–1828, p. 544; chapter 102, Resolves of 1803–04, line west of Connecticut River; Private Laws of Connecticut, Vol. 2, pp. 1540–1544, 1544–1550.)

The line is the original southerly line of the territory granted by the Council at Plymouth to Sir Henry Roswell and others in the third year of the reign of King Charles the First. This grant was afterwards confirmed by the King, and was described as "all the lands lying within the space of three English miles on the south part of Charles River or any and every part thereof."

In 1642 Massachusetts employed Messrs. Woodward and Saffrey to run out the line, but Connecticut did not join in this work, and afterwards disputed it. The line they ran was intended to be a straight line running due west from a point 3 miles due south of the most southern portion of Charles River.

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The charter granted to the Colony of Connecticut in 1662 bounds it on the north by the Massachusetts line.

In 1695 Connecticut had the line run out by Messrs. Butcher and Whitney. They began and ran a line supposed to be the same as the Woodward and Saffrey line, but it came out farther north.

In 1713 commissioners were appointed from both States to agree on and mark the line; and Feb. 13, 1714, they reported on the portion of the line east of the Connecticut River, and June 15 in the same year on the portion west of the river. By this agreement Massachusetts was to have the border towns of Enfield, Suffield and Woodstock, which had been settled by Massachusetts, but were located just south of the straight line; and in compensation therefor Connecticut was granted a tract of nearly 108,000 acres, which she sold, and the proceeds were given to Yale College.

The line was perambulated by both States in 1734; but many of the inhabitants of the border towns south of the line desired to belong to Connecticut, although against the protest of Massachusetts.

The matter continued in dispute until in 1749 the Legislature of Connecticut passed a resolution that, inasmuch as the line had not been approved by the King, and that the two colonies had no legal right to transfer territory without the confirmation of the Crown, the contract was void, and these towns were again taken under the jurisdiction of Connecticut. Massachusetts appealed to the King, but the claims of Connecticut were allowed.

Massachusetts was still dissatisfied, and in 1791 commissioners were appointed by both States to locate and mark the line, the commissioners from Connecticut, however, being limited to the establishment of the line west of the Connecticut River. But these commissioners were unable to effect any agreement, and so reported in 1802. The possession of the border towns still continued to be the subject of their differences.

The Massachusetts Legislature of 1802 requested the Governor to propose a compromise to the Governor of Con-

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necticut; and in 1803, the same having been accepted, commissioners from both States were appointed to complete the running out and re-marking the boundary line in accordance therewith.

The act appointing the commissioners provided that the line as marked by them should be the boundary line; but their joint report was confined to the line west of the Connecticut River, reciting, however, that they knew of no dispute regarding the line to the eastward. (See chapter 102 of Massachusetts Resolves of 1803, dated Feb. 18, 1804.)

The portion east of the Connecticut River remained unidentified until 1825, when the Governor was authorized to appoint commissioners for ascertaining and establishing this portion of the line, which, when defined, was forever afterwards to be the true boundary line between the two States.

The joint report of the commissioners was made to Massachusetts, and ordered by the Legislature in 1827 to be deposited and recorded in the Secretary's office, and to be printed with the Resolves of that year.

And from that time no dispute or misunderstanding has ever arisen as to the true boundary line between the two States.

The line, however, has not been surveyed since it was originally laid out and marked westerly from the Connecticut River in 1803 and easterly therefrom in 1826.

In 1899 the Massachusetts Topographical Survey Commissioners reported to the Legislature (Pub. Doc. No. 50) that a preliminary examination of a greater part of the line had been made, and it was found to be in an unsatisfactory condition. As to the portion east of the Connecticut River, while most of the angles named in the 1826 survey were marked, many of the monuments were found to be defaced and broken, and others not upright; the bounds were not of uniform size, not properly marked, and 75 points required new bounds.

The portion of the line west of the Connecticut River was in a far worse condition, and over 50 per cent. of the bounds at the highways were missing.

They reported that the whole line should be surveyed, and the location of all corners and summits determined by trian-

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gulation; the position of road stones should be tested. and the stones replaced on the line wherever wrongly put; that 130 granite monuments should be set, and 45 old ones reset, at an estimated cost of $14,000, or $7,000 for each State.

In the following year the entire line was perambulated, all the existing bounds and marks photographed, and a report of dimensions, descriptions and locations, together with special remarks, was made for the purpose of gaining a complete record of the situation.

In the year 1905 the Legislatures of Massachusetts and Connecticut severally appropriated the sum of $7,000 to cover the expense of rehabilitating the boundary line. This Board and the Connecticut Commissioners have met and made arrangements for perambulating the line, restoring and replacing all defaced and broken monuments, and adding such new ones as may be deemed necessary. When this work shall have been completed, the line may be perambulated once in five years, as required by the statutes, and the monuments preserved at comparatively slight expense.

Boundary Line between Massachusetts and New York.

From the days of the colonial charters the State boundary line between Massachusetts and New York seems to have been involved in entanglement and controversy. In this report, however, it would not be profitable to inquire into its history prior to the year 1773, when the action then taken appears, from the annual report of the State Engineer and Surveyor of the State of New York for the fiscal year ending Sept. 30, 1899 (page 200), to have been as follows: —

By act of the New York Assembly, passed March 8, 1773, "Commissaries" were appointed "to settle a Line or Lines of Jurisdiction, between this colony and the Province of the Massachusetts Bay." Commissioners with like powers having been appointed by Massachusetts, the joint commission met at Hartford, where it was unanimously agreed that "a line beginning at a place fixed upon by the two governments of New-York and Connecticut, in or about the year of our Lord one thousand seven hundred and thirty-one, for the northwest corner of a tract of land commonly called the Oblong, or equivalent land; and running from the said corner north twenty-one degrees, ten

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minutes and thirty seconds east, as the magnetic needle now points, to the north line of the Massachusetts Bay, shall at all times hereafter be the line of jurisdiction between the said province of the Massachusetts Bay and the said province of New-York, on its eastern boundary, shall adjoin the said province of the Massachusetts Bay."

The course north twenty-one degrees, ten minutes and thirty seconds east, is the general course of the Hudson River, as determined by survey in the winter of 1772.

From this it is obvious that the westerly boundary of Massachusetts was intended to be a straight line from beginning to end.

Owing to a disagreement of the commissioners, the line was then run no more than 20 miles. In 1784 both States requested Congress to appoint commissioners to carry out the agreement of 1773. In 1787 commissioners appointed by Congress met at the south end of the line, and, finding that a line run under the agreement would describe a curve, reported as follows, viz.: —

> Your commissioners afterwards, in order to save time, trouble and expense, proposed, instead of such a curve, to run a straight line or great circle of the globe — that is, to give equal tracts of country to each State that the curve would have done. . . . The equivalent line was found to be 11′ 40″ more westerly than the curve at the place of beginning — that is 15° 2′ 9″ east of the true meridian, which direction we carefully ascertained by many astronomical observations and afterwards pursued the same . . . to the northern boundary of the State of Massachusetts.

The line thus determined was accepted by both States as the jurisdictional line, and remained in force in its entirety until the cession of the Boston Corner tract was made.

It was marked by stone heaps, stakes and crosses cut in rocks.

Boston Corner, so called, at the south end of the line, embracing 1,010 acres, was set off and ceded to the State of New York in 1853, accepted by New York and subsequently ratified by act of Congress Jan. 3, 1855. Because of the substantial size of area ceded, it was doubtless thought an act of Congress was desirable, in order to avoid the possible inference that it might affect a political division of the country.

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In the annual report of the State Engineer and Surveyor of New York for the year 1903, on page 86, he says this line "was re-established in 1897, 1898 and 1899 by officers of the State of New York and of the Commonwealth of Massachusetts, and during these years was marked by 121 monuments, of which number 83 are granite and 38 iron."

In the report of the Massachusetts Topographical Survey Commission, House Doc. No. 1100 [1900], page 4, it is said that: —

The principle on which the present boundary was founded was proclaimed in 1664. In that year the royal commission which had been sent out to visit various colonies in New England, and which had been given, among other duties, that of determining the boundaries between different colonies in disputed cases, declared the western boundary of Massachusetts to be a straight line 20 miles easterly from the Hudson River, and parallel with its general direction in this latitude. The location of the southerly end of the line appears to have been generally agreed to, but the direction of the line was the cause of much dispute.

On page 8 it is said: —

The only change in this line since 1787 is that authorized by chapter 340 of the Acts of 1853, and ratified by Congress Jan. 3, 1855, by which the southwesterly corner of Massachusetts, known as "Boston Corner," and containing 1,010 acres, was ceded to the State of New York, in order to insure adequate police protection to territory which was the scene of much lawlessness. Plans of this "Corner" are on file in the State departments at Boston and Albany.

On page 9 it appears that in 1887 the line was run by the New York State Engineer and Surveyor, and but few marks were found which could be identified.

In 1836 Simeon Borden, an eminent surveyor, who was then employed by the Commonwealth to make a map of Massachusetts, not finding any monument to mark the boundary line at the junction of Massachusetts, Vermont and New York, placed a marble monument on the spot where he thought the true bounds of these three States conjoined.

It would be impossible for the Borden bound to co-exist in conjunction with other well-defined and accurately established and agreed monuments, and form a straight line.

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In 1892, by chapter 678 of the Acts of that year, New York established and defined all her boundary lines; and the State Engineer and Surveyor was directed every third year to examine all the monuments marking the State boundaries, and to replace or repair any lost or injured bounds, in co-operation with the representatives of adjoining States. In section 3 of said act the line is described as running from a marble post at Boston Corner marked on the east side M S, on the west side N Y and on the south side 1853; "thence along the line as the same was laid out by the United States Commissioners in 1787, north 15° 12′ 9″ east, 47 miles 73.81 chains, to a marble post marking the junction of the New York and Massachusetts line with the southern line of Vermont." To run a straight line, passing through well-identified monuments, and terminate at the Borden monument, would be impossible; either the straight line would have to disregard established monuments, or deviate at some point. The joint State survey hereinafter cited discovered the deviation.

In 1899 the Massachusetts Topographical Survey Commission and the New York State Engineer and Surveyor, acting jointly under the authority of legislative enactments of their respective States, re-covered and re-marked the old line of 1787. In so doing they discovered that the stone marking the northwest corner of Massachusetts was located 58 feet east of the true line; whereupon, with the concurrence of the Vermont Commissioners and the Massachusetts special commission appointed to act concurrently with the Vermont Commissioners in re-marking the boundary line between the States of Vermont and Massachusetts, the Massachusetts Topographical Survey Commission and the State Engineer of New York moved and set the stone on the spot agreed by all four bodies to be the true point of intersection of the boundary lines of the States of Massachusetts, Vermont and New York.

The extreme care and accuracy with which this work was done is shown in the report of the Massachusetts Topographical Survey Commission for the year 1899. From pages 10 and 11 of that report the following is quoted: —

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The line is straight for a distance of 47.2 miles. The difficulties incident to developing a perfectly straight line of this length upon the ground can only be known by those who have undertaken a similar task. A preliminary study showed that points that were supposed to be nearly on the line in 1787 could not be identified; it was therefore determined to adopt for the preliminary survey a base line which would represent as nearly as possible an average of the old stone piles and other marks already found. By running out this average line with the greatest possible accuracy, and connecting it with all the marks that could be found along its length, it was anticipated that some more favorable line could be found to represent the permanent line. To do this involved the selection of a point on Mount Misery opposite an old 1787 transit post, and far enough east, as shown by recent survey, to make the line follow the average line of stone piles at this northerly part of the line. Here a tripod signal was erected, and heliotrope flashes sent down the line toward Alandar Mountain, on which a point was selected that represented the average of the marks in this vicinity. This point was used as an instrument station for sighting to the flash on Mount Misery as a foresight, a distance of 37.9 miles; and, with the aid of the line thus established, a point was fixed on Mount Harvey, situated 16.3 miles north of Alandar. With these three points well set in line, other points were interpolated by the usual methods, and the straight line prolonged north of Mount Misery by transiting a distance of about 10 miles.

This base line was measured, and a rough profile taken. The points on the summits thus carefully established in line with each other were then connected with stations in the State primary system of triangulation by Mr. James B. Tolley, and their geodetic positions computed, to check both the alignment and the measurement. The result shows the base line work to be in good accord with the triangulation, and the azimuth of the line agrees within 13″ with that determined over one hundred years ago with cruder instruments and methods. Upon the completion of the survey it was found that this line had been run with so much care and was so near the probable line adopted in 1787 that it was difficult to determine how it could be materially improved. Near the southern extremity it was 1.9 feet east of the middle point between the M and N Y marks on the ledge on Alandar Mountain, and 1.8 feet west of the chiseled arrow between the M and N Y cut on the ledge at Mount Prospect a few miles further north. Near the northern extremity of the line it was a few feet east of the stone pile on Mount Misery, supposed to be the twelfth transit post of 1787, and a few feet west of the stone pile on Berlin Mountain, supposed to be the fifteenth transit post, and it passed directly through the stone pile on

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Rhodes Pinnacle, known to be the fourteenth transit post. It also passed through or close to several other well-identified old boundary marks. A wide divergence of about 58 feet to the east at the northern extremity of the line was disclosed by the survey. This divergence occurred in the last three-quarters of a mile, due, perhaps, to some error in the old survey in running by compass down the steep slope of Jim Smith Hill. Finally, the line determined with so much care was adopted; and, at a conference between the State Engineer and Surveyor of New York and this commission, the following agreement, providing for the setting of the bounds, was made.

Again, from page 13: —

Forty-seven new granite monuments 12 inches square and 9 feet long, 36 new granite monuments 12 inches square and 5 feet long, and 26 new cast-iron posts 5 feet long, set in concrete masonry, have been placed to mark the line; and 1 old road stone and 2 stone bounds at town corners have been re-set on the line.

The bound at the northwest corner of the State, set in 1896 by special commissioners of Massachusetts and Vermont, was found to be 58 feet too far to the east. By the consent of these commissioners this bound was moved westerly along the northerly boundary line produced, 58 feet to the point of intersection of the westerly and northerly lines, as now defined and marked.

Also, from page 14: —

Finally, acting with the officers or agents duly authorized by the State of New York, we have located, defined and marked the true line between the territory under the jurisdiction of the Commonwealth of Massachusetts and that under the jurisdiction of the State of New York.

A record plan, including a profile of the line, has been prepared, showing the location of all the monuments, town corners and road crossings, which, with five other plans and a description of the line, have been approved by the authorized agents of the two States, and filed with the Secretary of the Commonwealth.

In 1901, by chapter 374, the Legislature of Massachusetts passed an act establishing the boundary between the Commonwealth and the State of New York on the line which terminated at the northwest corner of the State in the bound heretofore referred to as set by the four representative bodies in 1899; and provided that the same should take effect on

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the first day of September in the year 1901, or as soon thereafter as a similar act passed by the State of New York, establishing the line described in this act, shall take effect. The draft of a similar act was reported by the State Engineer and Surveyor to the New York Legislature, but has not as yet been enacted into a law.

Ratification by Congress.

It having been questioned as to whether or not an act of Congress ratifying the action of States in delineating a common boundary line were essential to the validity of the jurisdiction so determined, and inasmuch as the States bordering on Massachusetts at different times concurrently with her had straightened lines, replaced monuments and made some slight alterations in their boundaries without inviting the confirmation of Congress, it would seem appropriate to state the law as determined by the Supreme Court at Washington, interpreting the meaning of that clause in the Constitution upon which the doubt seems to be founded.

The Constitution, in article 1, section 10, provides that no State shall without the consent of Congress enter into any agreement or compact with another State. Through a series of decisions of the Supreme Court this provision has come to be interpreted as meaning, not that there are no matters upon which States may make agreements, but that such agreements as may be made shall not affect the political integrity of the several States, or have a tendency to change their relationship to the United States.

Therefore, it would seem that an agreement or compact between two States, which, in establishing a boundary line, set over or interchanged inconsiderable areas for the purpose of straightening or more clearly indicating the same, the effect of which bore upon property rights only, and had no tendency to change the power or political relationship already existing between the States themselves or in their relationship to the United States, would not be repugnant to the Constitution or require the confirmation of Congress.

All changes made in establishing the boundaries of the Commonwealth are well within this rule except the ceding

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of 1,010 acres at Boston Corner to New York in 1853, in confirmation of which Congress enacted a law.

The Board recommends legislation relative to the removal or alteration of State boundary monuments, and will submit a draft of an act to accomplish that purpose.

Town Boundary Survey.

The work of determining the location of town boundaries has continued with the same organization as for the past few years. Two field parties were engaged on it from early in May to the middle of November. Previous to the latter date the field work necessary to mark the location of the new corners established on the boundary lines between Hamilton and Ipswich, Sandwich and Mashpee and Plainville and Wrentham had been done.

The permanent members of the field force have been engaged during the winter in plotting the results of the previous season's work, and preparing the data necessary for use in the field work of the next year.

One field party was engaged in the location of bounds of a series of 16 cities and towns in the southern portion of Worcester County, and the survey of the rivers and roads forming portions of these boundaries. The other party was engaged in determining the boundaries of two groups of towns in the northern part of Middlesex County, including the survey of streams and roads forming portions of the boundaries of these towns. In all, the two parties determined by triangulation the location of 239 bounds marking the angles in town lines, and made surveys of a little more than 20 miles of streams, roads and shore lines of ponds.

In the prosecution of the work a number of boundary lines were found to be very crooked, and in certain cases the town officers expressed a wish that they might be straightened; consequently, after consultation with the officers, the Board submitted to these towns for their concurrence plans for changing and straightening portions of the boundary lines between them. Five of the towns, viz., Hamilton, Wenham, Leominster, Paxton and Holden, assented to the proposed changes, but the town of Lancaster declined to concur.

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In the case of the boundary lines established by the Legislature of 1905, the Board has caused its engineers to set stakes at the new corners, and later the necessary stone monuments were set by the town officers.

The office force has been employed in computing the positions of town corners and triangulation stations whose positions were determined by the field parties the previous season; in making abstracts from the statutes relating to the establishment of the town boundaries; and preparing the results of the work for permanent record. The examination of the early court records for information in regard to the establishment of these boundaries has been completed, and the indexing of the field notes has been well advanced.

Three new atlases, describing the boundary lines of forty cities and towns, viz., Newton, Dedham, Dover, Needham, Wellesley, Westwood, Foxborough, Medfield, Norwood, Sharon, Walpole, Ashland, Framingham, Bellingham, Franklin, Holliston, Medway, Millis, Natick, Norfolk, Plainville, Sherborn, Wrentham, Gloucester, Newburyport, Amesbury, Essex, Georgetown, Groveland, Hamilton, Ipswich, Manchester, Merrimac, Newbury, Rockport, Rowley, Salisbury, Topsfield, Wenham and West Newbury, have been distributed during the year.

Another atlas, describing the boundaries of 11 cities and towns, viz., Andover, Boxford, Haverhill, Lawrence, Lynnfield, Methuen, Middleton, North Andover, North Reading, Reading and Wilmington, is now in the hands of the printer; and the material for another atlas, describing the boundaries of 14 cities and towns, viz., Ayer, Billerica, Carlisle, Chelmsford, Dracut, Dunstable, Groton, Littleton, Lowell, Pepperell, Shirley, Tewksbury, Tyngsborough and Westford, is being prepared for the printer.

On the first of December, 1905, atlases describing the boundaries of 139 cities and towns, out of a total of 354 in the Commonwealth, had been completed and distributed as provided by the statute; and an atlas containing the descriptions of 11 additional cities and towns was in the hands of the printer.

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Sale and Disposition of Massachusetts Atlas Sheets and Town Boundary Atlases.

There has been paid into the treasury of the Commonwealth during the year, under authority of chapter 57 of the Resolves of 1890 and chapter 360 of the Acts of 1900, the sum of $241.40, received from the sale of Massachusetts atlas sheets and town boundary atlases. Under chapter 360 of the Acts of 1900 one hundred and nineteen town boundary atlases have been distributed among the officers of the various cities and towns and others. Under chapter 95 of the Resolves of 1891 one topographical atlas has been given to the Civil Service Commission and one to the State Forester.

Inspections made during the Year.

The following inspections have been made by and under the direction of the Board: —

1905.		
Mar.	28–30.	Stage harbor, at Chatham; Herring River; Bass River, at South Yarmouth; Lewis Bay; East and West bays, at Osterville, — in company with legislative committee.
Apr.	24–26.	Nantucket harbor; Vineyard Haven harbor; Menamsha Inlet; Cuttyhunk harbor; Paskamansett River and Apponagansett harbor, — in company with legislative committee.
May	1.	Site of proposed pier in tide water, at Beverly.
May	3.	Work in progress on the Commonwealth flats, at South Boston.
May	8.	Work done by the Commonwealth at Bass River, South Yarmouth; East and West bays, Osterville; Cotuit harbor.
May	12.	Site of proposed marine railway at Winthrop, in Boston harbor.
May	26.	Protective works on Connecticut River, at Hadley and Hatfield.
June	6.	Connecticut River bank, at West Springfield.
June	16.	Bridge of New York, New Haven & Hartford Railroad Company across Cohasset Narrows, in Bourne and Wareham.
June	23.	Province Lands, at Provincetown.

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1905.

June 27. Site of proposed breakwater north of Cherry island bar, in Revere, authorized by chapter 108, Resolves of 1905.

July 7. Paskamansett River; Cuttyhunk harbor; Menamsha Inlet; Vineyard Haven harbor; Lake Anthony and Nantucket harbor, — relative to improvements authorized by the Legislature.

July 13. Site of proposed bridge across Danvers River, between Salem and Beverly, and approaches thereto, authorized by chapter 371, Acts of 1903.

July 28. Site of proposed breakwater in Folly Cove, Gloucester.

Sept. 21. Nashawena Island, in relation to a harbor.

Oct. 7–9. Work done by the Commonwealth at Stage harbor; Bucks Creek; Witchmere harbor; Herring River; East and West bays, Osterville; Cotuit harbor.

Oct. 16. Dike on Connecticut River, at Hatfield, built by the Commonwealth.

Oct. 26–29. Boundary line between Massachusetts and New York.

Nov. 16. Work done by the Commonwealth at Stage harbor; Lewis Bay; Bass River, at South Yarmouth; Witchmere harbor; Herring River.

LICENSES GRANTED DURING THE YEAR.

Nos.

2907. Petition of the Kilburn Mill for license to lay a pipe and construct two wells for condensing purposes in Clark's Cove, in the city of New Bedford. Granted Dec. 7, 1904.

2908. Petition of the Old Colony Railroad, the New York, New Haven & Hartford Railroad Company, lessee, for license to rebuild its bridge across Broad Cove, in Dighton and Somerset, and to fill solid. Granted Dec. 19, 1904.

2909. Petition of the Old Colony Railroad, the New York, New Haven & Hartford Railroad Company, lessee, for license to fill solid a portion of its bridge, known as Bridge No. 209, across a cove in Taunton River, in Taunton. Granted Dec. 19, 1904.

2910. Petition of Elbert S. Kip for license to build a pile wharf on Vineyard Sound, in Falmouth. Granted Dec. 19, 1904.

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Nos.

2911. Petition of the city of Boston for approval of plans for the construction and maintenance of a water pipe box and a tunnel for a water pipe across Fort Point Channel, near Dover Street bridge, under authority of chapter 273 of the Acts of 1904. Granted Dec. 26, 1904.

2912. Petition of Charles Whittemore for license to build a sea wall and fill solid in Buzzards Bay at Long Neck, in Wareham. Granted Dec. 28, 1904.

2913. Petition of the city of Salem for approval of plans for laying and maintaining a 60-inch iron pipe sewer in Collins Cove, in Salem, under authority of chapter 353 of the Acts of 1901. Granted Dec. 29, 1904.

2914. Petition of the Dartmouth Manufacturing Corporation for license to fill solid on Acushnet River, in New Bedford. Granted Dec. 29, 1904.

2915. Petition of Nancy E. Bliss for license to build and maintain a wharf, marine railway and float stage in Pocasset harbor at Pocasset, in Bourne. Granted Dec. 29, 1904.

2916. Petition of James H. Dwinell for license to build and maintain a pile pier and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2917. Petition of Linda Winsor for license to build and maintain a pile pier, marine railway and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2918. Petition of Henry N. Richards for license to build and maintain a pile pier and float stage in Pocasset harbor at Cataumet, in Bourne. Granted Jan. 3, 1905.

2919. Petition of Boston & Maine Railroad for license to rebuild its Pier No. 5 on Charles River, in Boston. Granted Jan. 3, 1905.

2920. Petition of the Old Colony Street Railway Company for license to construct a pole line in and over North Watuppa Pond, in Fall River. Granted Jan. 23, 1905.

2921. Petition of the city of New Bedford for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2922. Petition of Greene & Wood for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2923. Petition of the Pairpoint Corporation for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

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Nos.

2924. Petition of Edith Hastings for license to build a bulkhead and fill solid on Acushnet River, in New Bedford. Granted Jan. 26, 1905.

2925. Petition of Boston & Maine Railroad for license to build a temporary pile bridge across Merrimac River, in Haverhill. Granted Jan. 26, 1905.

2926. Petition of Francis J. Cain for license to build and maintain a pile wharf and float stage on Weymouth Fore River, in Weymouth. Granted Jan. 30, 1905.

2927. Petition of the Nobnocket Club for license to build a pile pier in Vineyard Haven harbor, in Tisbury. Granted Jan. 30, 1905.

2928. Petition of the Continental Export Company for license to build a pile wharf and to dredge in Boston harbor, at Spectacle Island. Granted Jan. 30, 1905.

2929. Petition of Alexander C. Adams and John A. Morse for license to build a pile and timber jetty in Cotuit Bay, at Cotuit, in Barnstable. Granted Jan. 30, 1905.

2930. Petition of Herbert M. Sears for license to build and maintain a pile pier and float stage in Salem harbor, in Beverly. Granted Feb. 3, 1905.

2931. Petition of Bessie Goldberg for license to build a pile structure on South River, in Salem. Granted Feb. 3, 1905.

2932. Petition of the Marblehead Transportation Company for license to build and maintain a sea wall, marine railway and float stages, and to fill solid, in Marblehead harbor, in Marblehead. Granted Feb. 10, 1905.

2933. Petition of the trustees of the New England Real Estate Trust, and the Walworth Manufacturing Company, for license to build bulkheads and fill solid in Boston harbor near the Reserved Channel, at South Boston. Granted March 6, 1905.

2934. Petition of the trustees of the New England Real Estate Trust for license to build bulkheads and fill solid in Boston harbor near the Reserved Channel, at South Boston. Granted March 6, 1905.

2935. Petition of Ella A. Chesley and William A. Rugg for license to construct a building over Little River, in Haverhill. Granted March 13, 1905.

2936. Petition of A. W. Davis and G. W. Harding for license to construct and maintain a building and pile platform on Duck Creek, in Wellfleet. Granted March 13, 1905.

2937. Petition of Lorenzo D. Baker for license to construct and maintain a building and pile platform on Duck Creek, in Wellfleet. Granted March 13, 1905.

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Nos.

2938. Petition of the Boston & Albany Railroad, the New York Central & Hudson River Railroad Company, lessee, for license to rebuild a bridge, on piles, on its Grand Junction Branch across Charles River, in Boston and Cambridge. Granted March 20, 1905.

2939. Petition of the city of Boston for license to rebuild and repair a portion of its wharf on the southerly side of Gallops Island, in Boston harbor. Granted March 23, 1905.

2940. Petition of William B. Stearns and George T. McKay for license to build a pile structure in Marblehead harbor, in Marblehead. Granted March 23, 1905.

2941. Petition of Emma F. Keith for license to build and maintain a pile pier, pile platform and float stage in Hull Bay, in Hull. Granted March 28, 1905.

2942. Petition of the Bliss Coal Company for license to build a pile wharf and to dredge in Lynn harbor, in Lynn. Granted March 28, 1905.

2943. Petition of G. Henry Whitcomb for license to extend his wharf, on piles, on Taunton River, in Fall River. Granted April 4, 1905.

2944. Petition of Albert T. Stearns for license to build a bulkhead and fill solid on Neponset River, in Boston. Granted April 6, 1905.

2945. Petition of the A. T. Stearns Lumber Company for license to build pile structures and fill solid on Neponset River, in Boston. Granted April 6, 1905.

2946. Petition of the estate of Edward R. Talbot for license to extend a wharf, on piles, on Taunton River, in Dighton. Granted April 18, 1905.

2947. Petition of Boston & Maine Railroad for license to extend the fender pier at Draw No. 1 in its bridge across Charles River, in Boston. Granted April 24, 1905.

2948. Petition of Boston & Maine Railroad for license to build and maintain a pile dolphin in Charles River, in Boston. Granted April 24, 1905.

2949. Petition of Catherine Hayes for license to build and maintain a pile pier and float stage in Buzzards Bay at Peters Neck, in Wareham. Granted April 28, 1905.

2950. Petition of Job Churchill for license to build a dike and flume and draw water from John's Pond, in Carver. Granted April 28, 1905.

2951. Petition of the Cottage Park Hotel Corporation for license to build embankments and to excavate in Boston harbor, in Winthrop. Granted May 3, 1905.

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Nos.

2952. Petition of the Sewer Commissioners of Fairhaven for license to build and maintain sewers in Acushnet River, in Fairhaven. Granted May 3, 1905.

2953. Petition of the Cambridge Bridge Commission for approval of plans for the construction of a highway bridge without a draw therein, across Charles River between Boston and Cambridge, to be known as Brookline Street bridge, under authority of chapter 391 of the Acts of 1904. Granted May 5, 1905.

2954. Petition of William H. Moore for license to extend a pier, on piles, and locate and maintain a float stage in Massachusetts Bay, in Beverly. Granted May 9, 1905.

2955. Petition of the Charlestown Gas and Electric Company for license to extend its wharf, partly solid and partly on piles, on Mystic River, in Boston. Granted May 9, 1905.

2956. Petition of Burgess & Packard for license to build and maintain two marine railways, on piles, a portion of a building, and a float stage, in Marblehead harbor, in Marblehead. Granted May 11, 1905.

2957. Petition of Freeman M. Crosby for license to build and maintain a pile pier on Vineyard Sound at Centerville, in Barnstable. Granted May 11, 1905.

2958. Petition of the town of Plymouth for license to build and maintain a sewer outlet in Plymouth harbor, in Plymouth. Granted May 15, 1905.

2959. Petition of the Edison Electric Illuminating Company of Boston for license to rebuild and strengthen a portion of its wharf on Fort Point Channel, in Boston. Granted May 16, 1905.

2960. Petition of the Haverhill & Boxford Street Railway Company for approval of plans for the construction of a bridge and approaches thereto across Merrimac River, in Haverhill, under authority of chapter 449 of the Acts of 1904, and chapter 130 of the Acts of 1905. Granted May 17, 1905.

2961. Petition of the Holyoke Water Power Company for license to erect structures for a power plant and to build and extend a shore wall on Connecticut River, in Holyoke. Granted May 17, 1905.

2962. Petition of Guy Norman for license to build and maintain a pile pier in Beverly harbor, in Beverly. Granted May 18, 1905.

2963. Petition of the County Commissioners of Essex County for approval of plans for the construction of a bridge and

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Nos.

approaches thereto across Merrimac River, in Haverhill, under authority of chapter 466 of the Acts of 1903, and chapter 411 of the Acts of 1905. Granted May 22, 1905.

2964. Petition of Mary A. Whiting for license to build and maintain a pier in Marion harbor, in Marion. Granted May 22, 1905.

2965. Petition of Catherine Doherty for license to extend a wharf, partly solid and partly on piles, in Dorchester Bay, in Boston. Granted May 31, 1905.

2966. Petition of the city of Boston for approval of plans for the construction and maintenance of a tunnel for a water pipe under the south channel of Mystic River, in Boston, under authority of chapter 273 of the Acts of 1904. Granted June 6, 1905.

2967. Petition of Leonard Thompson for license to build a sea wall, construct a dolphin, fill solid and to dredge, in Hingham harbor, in Hingham. Granted June 8, 1905.

2968. Petition of Boston & Maine Railroad for license to extend piers 6 and 7 at the Hoosac Tunnel Docks on Charles River, in Boston. Granted June 8, 1905.

2969. Petition of Samuel L. Minot and the estate of Joshua Crane for license to build and maintain a pile pier and float stage in Pocasset harbor, in Bourne. Granted June 8, 1905.

2970. Petition of the Home Club for license to build and maintain a pile pier in Edgartown harbor, in Edgartown. Granted June 9, 1905.

2971. Petition of Herbert M. Chase for license to build and maintain a boat landing in Lake Anthony, in Cottage City. Granted June 26, 1905.

2972. Petition of the Haverhill Electric Company for license to lay cables in and under Merrimac River, in Haverhill. Granted June 26, 1905.

2973. Petition of the city of Haverhill for license to construct a submerged outlet for the Mill Street sewer system, in Merrimac River, in Haverhill. Granted June 26, 1905.

2974. Petition of Frederick E. Baker and Zenia E. Strout for license to build a sea wall and fill solid in Lynn harbor, in Nahant. Granted June 29, 1905.

2975. Petition of John C. Haynes for license to build a pile pier and timber breakwater in Buzzards Bay at Sippowissett, in Falmouth. Granted June 29, 1905.

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Nos.

2976. Petition of the Marblehead Transportation Company for license to build and maintain a sea wall, marine railway and float stages, and to fill solid, in Marblehead harbor, in Marblehead. Granted July 11, 1905.

2977. Petition of Henry H. Fay for license to build and maintain a marine railway and to dredge, in Woods Hole Great harbor at Woods Hole, in Falmouth. Granted July 20, 1905.

2978. Petition of the Cape Cod Cranberry Company for license to build a flume and draw water from Cook's Pond, in Plymouth. Granted July 20, 1905.

2979. Petition of the Turners Falls Lumber Company for license to hang and maintain two booms in Connecticut River, in Gill and Montague. Granted July 20, 1905.

2980. Petition of the County Commissioners of Essex County for license to build a temporary bridge over the "Canal," in Gloucester. Granted July 28, 1905.

2981. Petition of Paul Butler and Blanche Butler Ames for license to extend their wharf in Gloucester harbor, in Gloucester. Granted July 31, 1905.

2982. Petition of the city of Gloucester for license to build and maintain a pipe way and conduits across the "Canal" near the Cut bridge, in Gloucester. Granted Aug. 1, 1905.

2983. Petition of the Valvoline Oil Company for license to build a pile wharf on Chelsea Creek, in Chelsea. Granted Aug. 1, 1905.

2984. Petition of the Federal Contracting Company for license to build and maintain breakwaters in tide water at Folly Point, in Gloucester. Granted Aug. 25, 1905.

2985. Petition of the Metropolitan Park Commission for license to fill solid at the Quincy Shore Reservation with material dredged from Quincy Bay, and to build a drawless bridge over Sachem Brook, in Quincy. Granted Aug. 25, 1905.

2986. Petition of the County Commissioners of Hampden County for approval of plans for the construction of a bridge over Connecticut River, connecting Exchange Street in Chicopee with Wayside Avenue in West Springfield, under authority of chapter 398 of the Acts of 1904. Granted Sept. 5, 1905.

2987. Petition of the city of Haverhill for license to construct a submerged sewer outlet in Merrimac River, in Haverhill. Granted Sept. 12, 1905.

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2988. Petition of the town of Hadley for license to build a drain for surface water and an outfall therefor, on the bank of Connecticut River, in Hadley. Granted Sept. 15, 1905.

2989. Petition of the trustees under the will of John C. Inches, trustees under the will of Martin Brimmer, and others, for license to build a pile wharf at the westerly end of the dock between T Wharf and Long Wharf, in Boston. Granted Sept. 19, 1905.

2990. Petition of the Proprietors of Boston Pier or the Long Wharf for license to build a pile wharf at the westerly end of the dock between Long Wharf and T Wharf, in Boston. Granted Sept. 19, 1905.

2991. Petition of Lennox & Briggs and the Haverhill Gas Light Company for license to lay and maintain a pipe in Little River, in Haverhill. Granted Sept. 26, 1905.

2992. Petition of the Salem Electric Lighting Company for license to rebuild its sea wall, build a new sea wall, drive piles and fill solid, on South River, in Salem. Granted Sept. 28, 1905.

2993. Petition of the Boston Tow Boat Company for license to build a pile pier and to dredge in Boston harbor, at East Boston. Granted Sept. 28, 1905.

2994. Petition of the Nantasket Beach Steamboat Company for license to widen its wharf, on piles, and to build three dolphins, on Weir River, in Hull. Granted Oct. 4, 1905.

2995. Petition of the Walworth Manufacturing Company for license to extend its wharf in Boston harbor near the Reserved Channel, at South Boston. Granted Oct. 4, 1905.

2996. Petition of F. T. Akin & Co. for license to extend their wharf, partly solid and partly on piles, on Acushnet River, in New Bedford. Granted Oct. 5, 1905.

2997. Petition of the city of Boston for license to rebuild its wharf in Boston harbor at the North Ferry, in East Boston. Granted Oct. 5, 1905.

2998. Petition of the heirs of William E. Gutterson for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

2999. Petition of the heirs of Sarah H. Stratton for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

3000. Petition of the heirs of Nelson Shumway for license to extend their wharf, on piles, on Fort Point Channel, in Boston. Granted Oct. 10, 1905.

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Nos.

3001. Petition of the city of Boston for license to widen the opening for the passage of vessels in Dover Street bridge on Fort Point Channel, in Boston. Granted Oct. 12, 1905.

3002. Petition of Charles W. Adams for license to build and maintain a pile pier and float stage in Onset Bay, in Wareham. Granted Oct. 31, 1905.

3003. Petition of Boston & Maine Railroad for license to widen its pile platform at Mystic Wharf on the north channel of Mystic River, and to dredge, in Boston. Granted Oct. 31, 1905.

3004. Petition of the Metropolitan Park Commission for license to fill solid and to dredge in Broad Sound at the Revere Beach Reservation, in Revere. Granted Nov. 13, 1905.

3005. Petition of the city of Boston for license to dump snow and ice into tide waters. Granted Nov. 17, 1905.

3006. Petition of the Boston Elevated Railway Company for license to dump snow and ice into tide waters. Granted Nov. 17, 1905.

3007. Petition of the Union Freight Railroad Company for license to dump snow and ice into Charles River, in Boston. Granted Nov. 17, 1905.

3008. Petition of Mary A. Curry for license to build and maintain a pile wharf and a float stage on Back River at Monument Beach, in Bourne. Granted Nov. 20, 1905.

3009. Petition of the County Commissioners of Essex County for approval of plans for building a bridge over the "Canal" in Gloucester, under authority of chapter 254 of the Acts of 1905. Granted Nov. 20, 1905.

3010. Petition of Charles E. Davis for license to build and maintain a pile wharf on Lees River, in Swansea. Granted Nov. 21, 1905.

3011. Petition of Malvina S. Nazro for license to build and maintain a pile wharf and float stage in Buzzards Bay, in Wareham. Granted Nov. 21, 1905.

3012. Petition of the County Commissioners of Essex County for approval of plans for the construction of a highway bridge and approaches thereto, over Danvers River, between Salem and Beverly, under authority of chapter 371 of the Acts of 1903. Granted Nov. 24, 1905.

Petitions denied and withdrawn.

On Dec. 21, 1904, the petition of David C. Percival for license to build a retaining wall in Marblehead harbor, at

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Marblehead Neck, was dismissed, it appearing from the de submitted that there is a restriction against building a structure on the beach in front of upland owned by the pe tioner.

On March 23, 1905, it was voted not to lease Noon Islan so called, in Ponkapoag Pond, on petition of Fred H. Bix and S. Austin Thayer, as it was wanted for the Metropolit Park.

On April 27, 1905, the Board declined to lease Ber Island in Lake Winthrop, in Holliston, for fear of a possib nuisance.

On May 10, 1905, the petition of the town of Marblehe for license to extend Cliff Street in tide water of Marblehe harbor, was dismissed without prejudice.

On May 17, 1905, the petition of Ambrose A. Mart for license to maintain a pile pier and marine railway Boston harbor, in the town of Winthrop, was further consi ered; and it was voted, after public hearing, considerati of statements of petitioner and arguments of counsel a examination of premises, that the building of proposed stru tures should not be authorized, and the petitioner was giv leave to withdraw.

On Oct. 9, 1905, the Columbian Dredging Company, pe tioner for authority to dump dredged material on flats ne Hunts Hill Point, in Weymouth, was granted leave to wit draw, as the owners of property in the vicinity objected to t same, claiming that it would interfere with access to the land.

On Oct. 25, 1905, the New York, New Haven & Hartfo Railroad Company, petitioner for license to draw water fro Dennis Pond, in Yarmouth, at its request was given leave withdraw.

MISCELLANEOUS PERMITS GRANTED DURING THE YEAR.

WATER DEPARTMENT OF THE CITY OF BOSTON, to dump on t Commonwealth flats at South Boston material taken fro excavations in the city of Boston. Granted Dec. 23, 190

BOSTON ELEVATED RAILWAY COMPANY, to dump snow and i on the Commonwealth flats at South Boston. Granted De 27, 1904.

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ISAAC BLAIR & Co., to dump snow from Dover Street bridge into tide water, in Boston. Granted Dec. 28, 1904.

THOMAS BUTLER & Co., to use for storage purposes a portion of the Commonwealth pier at South Boston. Granted Dec. 29, 1904.

FRANK J. HANNON, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 2, 1905.

CHARLES DUNCAN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 2, 1905.

THOMAS BUTLER & Co., to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

ESTATE OF PATRICK O'RIORDEN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

JAMES MCGOVERN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted Jan. 2, 1905.

JONES & MEEHAN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 13, 1905.

JAMES F. DOOLEY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 16, 1905.

MARY DOYLE, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 24, 1905.

H. P. NAWN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Jan. 24, 1905.

MOULTON & HOLMES, to dump ashes on the Commonwealth flats at South Boston. Granted Feb. 7, 1905.

GEORGE G. CROCKER, ALVIN F. SORTWELL and FREDERIC D. FISK, trustees of the Main Street Land Trust, to dredge material from their flats in Charles River, on the Cambridge side of the channel, near Cambridge bridge. Granted Feb. 8, 1905.

JAMES FEELEY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Feb. 27, 1905.

JAMES MCGOVERN, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Feb. 27, 1905.

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THOMAS A. ELSTON & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted March 8, 1905.

JAMES S. SWEENEY, to dump engine ashes on the Commonwealth flats at South Boston. Granted March 9, 1905.

JOSEPH L. BOARDMAN, to remove gravel from Salter's beach, in Plymouth. Granted March 15, 1905.

NAHANT & LYNN STREET RAILWAY COMPANY, to dredge flats in Lynn harbor, in the town of Nahant, for the purpose of obtaining material for constructing its road bed. Granted April 6, 1905.

BAY STATE DREDGING COMPANY, to dredge material from Boston harbor, southwesterly of Deer Island. Granted April 10, 1905.

ESTATE OF PATRICK O'RIORDEN, to dredge material from Boston harbor, southwesterly of Deer Island. Granted April 10, 1905.

STANDARD OIL COMPANY of New York, to dredge in Chelsea Creek, at and near its property known as Maverick Dock. Granted April 12, 1905.

METROPOLITAN PARK COMMISSION, to excavate material in Lynn harbor. Granted April 18, 1905.

JONES & MEEHAN, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted May 4, 1905.

C. W. JOHNSON, to remove rocks from the channel of Connecticut River at the "Rapids," between Northampton and South Hadley. Granted May 9, 1905.

COLEMAN BROTHERS, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted May 31, 1905.

COLEMAN BROTHERS, to use for storage purposes a portion of the Commonwealth flats at South Boston. Granted June 2, 1905.

R. S. BRINE TRANSPORTATION COMPANY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted June 12, 1905.

DAVID BENSHIMOL, to remove stones, kelp and sea weed from Back beach, opposite Sewall Avenue, in Winthrop. Granted June 29, 1905.

R. S. BRINE TRANSPORTATION COMPANY, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 3, 1905.

WILLIAM BARRETT, to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 10, 1905.

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MILTON DA COSTA, to use and occupy Quarantine Rock, in Boston harbor. Granted July 11, 1905.

NEW BEDFORD, MARTHAS VINEYARD & NANTUCKET STEAMBOAT COMPANY, to excavate in the dock adjoining the wharf of the New York, New Haven & Hartford Railroad Company, in Woods Hole Great harbor at Woods Hole, in Falmouth. Granted July 20, 1905.

BAY STATE DREDGING COMPANY, to dump material dredged from Lynn harbor at the Nahant Beach Parkway. Granted July 20, 1905.

WILLIAM J. RAFFERTY & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted July 26, 1905.

BAY STATE DREDGING COMPANY, to dump material dredged from Lynn harbor on Longfellow beach, in Nahant. Granted July 31, 1905.

THOMAS A. ELSTON & Co., to dump on the Commonwealth flats at South Boston material taken from excavations in the city of Boston. Granted Sept. 12, 1905.

HENRY H. SYLVESTER, to remove stone from the beach at North Scituate, south of the life-saving station. Granted Sept. 12, 1905.

METROPOLITAN PARK COMMISSION, to dump material excavated from Lynn harbor on the northerly portion of the Revere Beach Reservation. Granted Oct. 17, 1905.

NANTASKET BEACH STEAMBOAT COMPANY, to remove accumulations of sand in the berths and around Pemberton pier, in Hull. Granted Oct. 18, 1905.

T. F. WHOLEY, to dump ashes on the Commonwealth flats at South Boston. Granted Oct. 31, 1905.

BOSTON BRIDGE WORKS, to build a temporary pile trestle for the purpose of rebuilding the superstructure of the Boston & Albany Railroad bridge on Connecticut River, in Springfield. Granted Oct. 31, 1905.

BAY STATE DREDGING COMPANY, to dump material excavated from Chelsea Creek, in Belle Isle Inlet and adjacent creeks, in Boston and Revere. Granted Nov. 3, 1905.

EASTERN DREDGING COMPANY, to dump material excavated from Malden River in the old bed of said river and on certain flats therein. Granted Nov. 9, 1905.

BOSTON ELEVATED RAILWAY COMPANY, to dump snow and ice on the Commonwealth flats at South Boston. Granted Nov. 27, 1905.

EDWARD W. DIXON, to place the steamer "King Philip" in the Commonwealth dock at South Boston. Granted Nov. 27, 1905.

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Work of the United States in Rivers and Harbors of the Commonwealth.

The Board is indebted to Col. W. S. Stanton, Corps of Engineers, U. S. A., who is in charge of river and harbor improvements in eastern Massachusetts, and Lieut.-Col. J. H. Willard, Corps of Engineers, U. S. A., who is in charge of similar work in southern Massachusetts, for the following statements, which show the work accomplished in the rivers and harbors of the Commonwealth during the fiscal year ending June 30, 1905: —

Statement of Col. W. S. Stanton, Corps of Engineers, U. S. A.

Boston, Mass., Dec. 20, 1905.

Board of Harbor and Land Commissioners, Commonwealth of Massachusetts, State House, Boston, Mass.

Sirs: — In compliance with your request of Nov. 2, 1905, I have the honor to furnish the following summary of work accomplished by the United States during the fiscal year ended June 30, 1905, upon the improvement of rivers and harbors in Massachusetts under my charge.

Newburyport Harbor.

Under a contract for repairing both jetties at the mouth of the Merrimac River, and for extending the south jetty, 11,328 tons of rubble stone were deposited in the south jetty. The work which was in progress at the close of the fiscal year has been since completed, 300 linear feet of the south jetty and 550 linear feet of the north jetty having been re-topped, and the south jetty extended 291 feet. Funds are available for extending the north jetty 175 feet, for which a contract will be made during the winter. By a survey made in 1905 it appears that the depth on the bar at the mouth of the river, which prior to the construction of jetties was 7 feet, is now 13 feet, at mean low water.

Breakwater for Harbor of Refuge, Sandy Bay, Cape Ann.

During the year, under a contract (since completed), 62,510½ tons of stone were placed in the western, and 31,786 tons in the southern, arm; total, 94,296½ tons. This breakwater is to be 9,000 feet in length. At the close of the fiscal year it had been built to about mean low water for a length of 2,250 feet, and to partial heights below mean low water for 5,280 feet additional.

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Rockport Harbor.

Several small ledges of rock were removed, amounting to 130.6 cubic yards.

Gloucester Harbor.

In the breakwater at the entrance to this harbor 34,040½ tons of stone were deposited, completing 843 feet of the superstructure. Since the close of the year the entire breakwater, 2,065 feet in length, has been completed, including a rubble mound at its end for a lighthouse site.

Lynn Harbor.

Under the project to dredge the channel 200 feet wide from the sea to the anchorage basin, and the anchorage basin itself to the depth of 15 feet at mean low water, a continuing contract was made for the completion of the entire improvement by June 30, 1907, and dredging commenced two days before the close of the fiscal year.

Boston Harbor.

Twenty-seven-foot Channel. — In the Narrows the excavation of 24 ledges, covering nearly 4 acres, and amounting to 19,231 cubic yards of rock, has been in progress throughout the year, and has been completed except the removal of a few small points of solid rock and some scattered débris. Early in the year 1906 all ledges will have been removed from this channel 1,000 feet wide and 27 feet in depth from President to Nantasket Roads. During the year 73,441 cubic yards of mud, sand, gravel and clay have been dredged from the channel, in maintenance.

In the upper main ship channel from President Roads to Boston the removal of 11 ledges, embracing 2,066 cubic yards, has been in progress and is substantially completed, except the removal of a few small points of solid rock and scattered débris. The only other ledge remaining to be removed to complete the 27-foot channel is also to be removed in obtaining the 35-foot channel, and has been drilled and blasted, and the dredging of the fractured rock, with the removal of the few points above mentioned, is all that remains to complete the 27-foot channel from Boston to Nantasket Roads.

Thirty-foot Channel. — In Broad Sound 39,568 cubic yards of sand and gravel have been dredged, and 2 ledges of rock containing 156 cubic yards have been removed, completing the channel to the authorized width of 1,200 feet and depth of 30 feet at mean low water from President Roads to the sea. For guiding vessels from the coast to this channel a lighthouse has also been completed on the Graves, from which the light was first exhibited

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Sept. 1, 1905, completing, with the range lights on Lovells Island for the seaward arm and on Spectacle Island for the inner arm, the lighting of this channel.

Thirty-five-foot Channel. — Under this project, during the year, from the channel between President Roads and the Navy Yard, Chelsea and Charles River bridges, there were dredged 2,090,011 cubic yards of mud, sand, clay, etc., and 4.2 cubic yards of bowlders; and from the channel between President Roads and the sea, 152,391.5 cubic yards of sand, gravel and clay; making a total of 2,242,506.7 cubic yards. April 26, 1905, a contract was made for excavating 16,555 cubic yards of rock, covering nearly 3 acres, to the depth of 35 feet at mean low water.

Sea Walls. — Minor repairs, consisting of pointing and protecting their foundations with riprap, were made to portions of the 3 miles of sea walls that protect the islands and headlands from the harbor.

Plymouth Harbor.

For the security of this harbor a dike of riprap for the preservation of Long beach was extended 1,375 feet, being now 11,843 feet in length.

Provincetown Harbor.

Under the project to arrest the erosion and promote the accretion of the barrier of beach and sand dunes which preserves the harbor, the works of protection have been extended and repaired during the fiscal year as follows. At Long Point 1,093 tons of rubble stone were deposited, completing to the full cross-section 120 linear feet of new breakwater, and re-topping 65 feet of old breakwater. In the vicinity of Abel Hill dike 191 feet of double bulkhead, 420 feet of single bulkhead and 10,964 feet of sand-catches were built, and 906 feet of bulkhead and 1,800 feet of sand-catches repaired. At Wood End bulkhead 1,750 linear feet of sand-catches were built, and minor repairs made elsewhere.

Very respectfully,

W. S. STANTON,
Colonel, Corps of Engineers.

Statement of Lieut.-Col. J. H. Willard, Corps of Engineers, U. S. A., showing the work done by the United States on the rivers and harbors of Massachusetts under the Newport, R. I., engineer office, during the fiscal year ending June 30, 1905: —

Hyannis Harbor.

The work of dredging in the anchorage area protected by the breakwater, in progress at the beginning of the fiscal year, was completed Sept. 3, 1904. The amount of material removed under

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the contract was 75,000 cubic yards. The total area to be deepened to 15.5 feet at mean low tide under the existing project for the improvement was 36 acres; of this, 34.5 acres have now been completed.

The river and harbor bill of March 3, 1905, appropriated $80,000 for the improvement of the harbors of Hyannis and Nantucket; of this amount, $10,000 was allotted for the completion of the project for the improvement of Hyannis harbor. A contract was entered into May 26, 1905, for dredging at both these harbors. The small amount of work at Hyannis harbor will be commenced about the time of the completion of the Nantucket work.

Nantucket Harbor.

The work under the contract of E. S. Belden & Sons of Hartford, Conn., for placing stone in the gap in the east jetty, in progress at the close of the last fiscal year, was completed July 21, 1904. Under this contract a total of 4,604 tons of stone were placed in the gap, by which it was filled to the level of mean low water.

The approved project for the expenditure of the $70,000 allotted to this work from the appropriation of March 3, 1905, for the improvement of Hyannis and Nantucket harbors, provides for extending the eastern jetty about 1,200 feet, repairing portions of the jetty, and dredging a channel about 200 feet wide and 12 feet deep at mean low water through the bar between the jetties.

A contract was entered into with E. S. Belden & Sons of Hartford, Conn., for stone work in the jetty, at the rate of $1.73 per ton, May 26, 1905. Work under this contract commenced June 5, 1905, and up to the close of the fiscal year 2,909½ tons of stone had been placed in the jetty.

Under date of May 26, 1905, a contract was entered into with the Morris & Cumings Dredging Company of New York for the dredging of the jetty channel, at the rate of 23.9 cents per cubic yard. The dredge commenced work June 23, 1905, and up to the close of the fiscal year 7,039 cubic yards had been dredged.

The breachway in the "Haulover" beach, separating the head of the harbor from the ocean on the eastern side of the island, has afforded an outlet for a large portion of the water which would otherwise have had to flow through the jetty channel. It is believed that the blocking up of the jetty entrance to the harbor by the jetties has contributed in no small degree to keeping the breach in the "Haulover" open. As it would be impracticable to close this breach by artificial means save at great expense, it was recommended that $50,000 of the allotment for this work from the appropriation of March 3, 1905, be applied to dredging, partly with a view to increasing the water way

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through the jetty channel, and thereby assisting in closing the breach in the "Haulover."

Vineyard Haven.

No works of improvement were in progress during the fiscal year. Further work at this harbor is dependent upon the results of the examination of the Board of Engineers, convened in accordance with the river and harbor act of June 13, 1902, to consider the general subject of harbors in the waters of this locality.

Little Harbor, Woods Hole.

The river and harbor act of March 3, 1905, appropriated $18,000 for dredging a channel 150 feet wide and 12 feet deep at mean low water from Vineyard Sound to the wharf of the lighthouse depot in Little Harbor, with a basin 300 feet wide and of the same depth in front of the wharf.

Under date of June 16, 1905, a contract was entered into with Charles M. Cole of Fall River, Mass., for doing this work, at the rate of 21 cents per cubic yard. The work of dredging was commenced June 26, and up to the close of the fiscal year 3,114 cubic yards of sand and gravel had been removed.

Woods Hole.

The river and harbor act of March 3, 1905, appropriated $70,000 for the improvement of the channel leading from Woods Hole to Buzzards Bay, and authorized the expenditure of an additional $100,000 for this work.

A project for the expenditure of the funds thus appropriated, contemplating the completion of the projected channel, had been approved, and specifications for the work had been prepared.

Weepecket Rock, Buzzards Bay.

This rock in Buzzards Bay off Uncatena Island, and in almost the direct line of travel from New Bedford to Woods Hole, in foggy weather, was a menace to vessels entering the Woods Hole strait from the Buzzards Bay end. Provision was made in the river and harbor bill of March 3, 1905, for its removal to a depth of about 10 feet.

Under date of June 5, 1905, a contract was entered into with Chas. E. Davis of New Bedford for the removal of this rock, for the lump sum of $1,380. The removal was completed July 3, 1905.

New Bedford Harbor.

The river and harbor bill appropriated $11,000 for dredging certain shoal areas along the wharf front both above and below

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the new Fairhaven bridge, and cutting off the shoal spit extending northwardly from Fish Island.

Under date of May 31, 1905, a contract was entered into with Charles M. Cole of Fall River, Mass., for the proposed dredging, and the work was completed June 21, 1905. The total amount of mud and sand removed was 54,446 cubic yards.

Taunton River.

An appropriation of $5,000 was made for the maintenance of the channel, which it was deemed desirable to retain until the season of 1906.

Fall River Harbor and Mount Hope Bay.

The work in progress at the beginning of the fiscal year, under the continuing contract with the J. S. Packard Dredging Company of Providence, R. I., for dredging a channel 300 feet wide and 25 feet deep at mean low tide in front of the city and across the flats in Mount Hope Bay, was continued until Sept. 6, 1904, when the work was completed. The total amount dredged under this contract was 1,091,462 cubic yards.

Removal of Wrecks.

The following wrecks were removed so as no longer to form obstructions to navigation: barkentine "Albertina," sunk on Chatham Bar; schooner "Viloa May," sunk on Shovelful Shoal; schooner "Frauline," sunk northeast of the northwest buoy on Common Flat, Chatham; schooner "Richard S. Leaming," sunk off Cross Rip Light Ship; schooner "Anna Laura," sunk 1¼ miles off Harding's beach, Chatham; steamship "Aransas," sunk in Pollock Rip Channel. The removal of the last-named wreck was in progress at the close of the fiscal year.

Preliminary Examinations and Surveys.

Provision was made in the river and harbor bill of March 3, 1905, for the examination of New Bedford harbor, with a view to obtaining additional anchorage grounds and increased depth.

APPROPRIATION FOR SURVEY AND IMPROVEMENT OF HARBORS.

By chapter 12 of the Acts of 1904 an appropriation of $5,000 was made for surveys of harbors and for improving and preserving the same, and for repairing damages occasioned by storms along the coast line or river banks of the Commonwealth.

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The following expenditures from this appropriation, in addition to those recited in the last report, were made in December, 1904, under the authority of section 9 of chapter 96 of the Revised Laws: —

Dredging southerly shore of South Boston,	$60 00
Red River, Chatham,	10 00
Vineyard Haven harbor,	3 00
West Bay, Osterville,	111 45
Total,	$184 45

In 1905 the appropriation for the same purpose was $5,000, from which sum expenditures have been made to December 1, in the localities and to the amounts following, viz.: —

Bass River, Yarmouth,	$49 93
Charles River,	91 80
Connecticut River, West Springfield,	135 00
Cuttyhunk harbor,	32 95
East Bay, Osterville,	31 42
Herring River,	48 75
Lake Anthony,	25 00
Lewis Bay,	90 94
Nantucket harbor,	107 94
Paskamansett River,	92 15
Red River, Chatham,	20 25
Stage harbor, Chatham,	102 00
West Bay, Osterville,	120 75
Witchmere harbor,	404 00
Total,	$1,352 88

Harbor Compensation Fund.

There was paid into the treasury of the Commonwealth during the year, under chapter 146 of the Acts of 1897, and chapter 96 of the Revised Laws, for tide water displaced by work done under licenses granted by the Board, and for rights and privileges granted in tide waters and great ponds, the sum of $105,257.52, which was credited to the harbor compensation fund for Boston harbor. The amount in this fund on Nov. 30, 1905, was $529,506.91; the balance of income from this fund in the treasury on the same date was $24,378.18; the total income for the year was $20,482.28.

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COMMONWEALTH'S FLATS IMPROVEMENT FUND.

The balance in the Commonwealth's flats improvement fund on the first day of December, 1904, was $1,315,014.67. To this has been added during the year $44,348.12 from the income of the fund and $28,305.90 from sales and rents of lands and other sources, making a total of $1,387,668.69. Of this sum there has been expended during the year $37,612.18, leaving a balance on Nov. 30, 1905, of $1,350,056.51, subject to reduction for existing liabilities by reason of the anchorage basin contracts under chapter 476 of the Acts of 1901, and for contribution toward building Northern Avenue and bridge under section 4 of chapter 381 of the Acts of 1903.

The Board requests that a further appropriation be made out of this fund, to be expended in improvements upon the Commonwealth's flats at South Boston, and for work therewith connected.

The foregoing report is respectfully submitted.

WOODWARD EMERY,
GEORGE E. SMITH,
HENRY J. SKEFFINGTON,
Commissioners.

DEC. 1, 1905.

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APPENDIX.

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APPENDIX.

[A.]

[See page 4 of this report, *ante*.]

CONTRACTS.

The contracts entered into during the year are as follows: —

1904.		
Dec. 1.	With C. A. Callahan and J. J. Callahan, for strengthening with stone riprap the outer portion of the eastern jetty at Bass River, Yarmouth, — amounting to	$4,578 98
1905.		
June 27.	With Joseph J. Callahan, for building dikes at the cut-through into Stage harbor, Chatham, — amounting to	7,143 81
July 26.	With the Eastern Dredging Company, for dredging in Fort Point Channel, — amounting to .	4,119 16
July 27.	With Thomas & Connor, for building new channel at mouth of Herring River, in Harwich, — amounting to	11,141 02
July 28.	With Daniel O'Connell's Sons, for building dike on the Connecticut River, at Hatfield, — amounting to	1,445 13
Aug. 2.	With the Bay State Dredging Company, for dredging at Paskamansett River, Lewis Bay and Witchmere harbor, — amounting to about . . .	9,650 00
Aug. 25.	With the Morris & Cumings Dredging Company, for dredging in Nantucket harbor, — amounting to	4,684 96
Aug. 25.	With William L. Miller, for building an extension to the concrete sea wall at Stony beach, Hull, — amounting to	2,728 82
Sept. 8.	With E. S. Belden & Sons, for building stone breakwater at Vineyard Haven harbor, — amounting to about	10,000 00
Sept. 15.	With William M. Swasey, for removing wreck of schooner "Annie E. Lane," at Beverly, — amounting to	250 00

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1905.		
Sept. 28.	With Joseph J. Callahan, for building jetties at Cuttyhunk, — amounting to about . . .	$5,000 00
Oct. 30.	With the New England Dredging Company, for dredging between Savin Hill and Commercial Point, Dorchester, — amounting to about . .	9,500 00
Nov. 20.	With the Eastern Dredging Company, for dredging in Fort Point Channel, in Boston harbor, — amounting to about	2,500 00
	Total, ...	$72,741 88

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[B.]

[See page 45 of this report, *ante*.]

REPORT OF THE SUPERINTENDENT, PROVINCE LANDS.

PROVINCETOWN, MASS., Nov. 30, 1905.

To the Board of Harbor and Land Commissioners.

GENTLEMEN: — In continuing the work on these lands, the same methods of treatment have been pursued as in previous years, namely, the transplanting of beach grass, trees and shrubs.

This season's work was commenced as soon as the ground was free from frost, about the first of April, and continued until the latter part of May, during which time the principal work was the transplanting of bayberry and young seedling pines. A considerable area of bayberry was planted, and about 20,000 seedling pines taken from the adjacent woods and bogs. Ninety per cent. of the bayberry lived and are doing well; but owing to the extreme drought which prevailed during the spring, only a small percentage of the seedling pines survive, while under favorable conditions of weather at least 80 per cent. should live and thrive.

Only 1 acre of grass was planted in the spring, as it has been demonstrated that the best results can be obtained from fall planting; therefore attention was given, until the latter part of May, to tree and shrub planting, and to keeping the roads through the lands in good condition for summer travel.

The work of transplanting beach grass was resumed in September, a portion of the force being thus engaged, and others employed in planting bayberry, the work being continued until the middle of November, covering during that time about 30 acres of the dunes, on a large part of which bayberry was planted.

On the outer range of sand dunes, where the work was started ten years ago, there has been a steady improvement from year to year; and it is reasonably certain that this range is permanently protected from any destructive forces, simply requiring protection from destructive human agencies in the future.

Of the many trees and shrubs which seem to be native to this section, some apparently spring up spontaneously where the sand is quiet; and in order to promote this growth, a great part of the

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work has been the transplanting of beach grass for the purpose of holding the sands preparatory to the introduction of a more permanent plant growth, namely, trees and shrubs.

A total of about 270 acres has been covered with grass since work of this character was commenced, in the spring of 1895, and within this area there have been planted large quantities of trees and shrubs, the larger part being bayberry or wax myrtle (*Myrica cerifera*), which has proved to be a quick grower, making a solid and close covering.

Of the trees planted, the most valuable for this work are the three varieties of pine, namely, native pitch (*Pinus rigida*), Scotch (*Pinus sylvestris*) and Austrian (*Pinus Austriaca*), which make satisfactory growth, and are well adapted to this soil and climate.

Bound "A" was moved by the ice last winter, and has been re-set in a cement foundation of sufficient size to withstand any pressure from that cause in the future.

Respectfully submitted,

JAMES A. SMALL,
Superintendent of the Province Lands.

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INDEX.

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INDEX.

Commissioners' Report.

	PAGE
Anchorage,	9
Annisquam River,	24
Appropriation for Survey and Improvement of Harbors,	83
Bass River, Beverly,	23
Bass River, Yarmouth,	33
Boston Harbor,	4
Charles River,	15
Chatham, Stage Harbor in,	28
Commonwealth's Flats at East Boston,	14
Commonwealth Flats at South Boston,	12
Commonwealth's Flats Improvement Fund,	85
Commonwealth Pier,	12
Connecticut River,	25
Agawam,	26
Hadley,	26
Hatfield,	25
West Springfield,	26
Cuttyhunk,	39
Danvers River,	23
Dorchester Bay,	10
Dorchester, dredging Easterly Shore of,	11
East Bay, Osterville,	34
Fall River,	46
Fall River-Somerset Bridge,	43
Fort Point Channel,	14
Great Ponds,	44
Green Harbor,	27
Hangman's Island,	19
Harbor Compensation Fund,	84
Herring River,	30
Hull, Stony Beach in,	16
Inspections,	64
Jeffries Point,	16
Lake Anthony, Cottage City,	41
Lewis Bay,	29
Licenses granted during the Year,	65
Massachusetts Atlas Sheets and Town Boundary Atlases,	64
Meetings, Hearings, etc.,	3
Miscellaneous Permits granted during the Year,	74
Nashawena Island,	37
Nantucket Harbor,	41
Naval Magazine, Land for,	18

Digitized by Google

PAGE

New Bedford Harbor Line, ... 35
Northern Avenue and Bridge, ... 13
Paskamansett River, ... 36
Petitions denied and withdrawn, ... 73
Province Lands, ... 43
Revere Breakwater, ... 19
Saugus River, ... 20
Scituate, ... 27
South Bay, ... 15
Stage Harbor, Chatham, ... 28
State Boundaries, ... 46
Massachusetts and New Hampshire, ... 47
Massachusetts and Vermont, ... 48
Massachusetts and Rhode Island, ... 49
Massachusetts and Connecticut, ... 52
Massachusetts and New York, ... 55
Ratification by Congress, ... 61
Stony Beach, Hull, ... 16
Taxation of Forest Lands, ... 46
Town Boundary Survey, ... 62
Town River, ... 17
United States, Work of, in Rivers and Harbors of the Commonwealth, . 78
Statement of Col. W. S. Stanton, Corps of Engineers, U. S. A., . 78
Statement of Lieut.-Col. J. H. Willard, Corps of Engineers, U. S. A., 80
Vineyard Haven Harbor, ... 40
West Bay, Osterville, ... 35
Weymouth Fore River, ... 17
Witchmere Harbor, ... 31
Wrecks and Obstructions, ... 42

Appendix.

Contracts entered into during the Year, ... 89
Report of the Superintendent of the Province Lands, ... 91

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PUBLIC DOCUMENT . . . . . No. 25.

REPORT

OF THE

COMMISSIONERS

ON

FISHERIES AND GAME

FOR THE

YEAR ENDING DECEMBER 31, 1905.



. 30
31, 173
. 31
. 34
. 37
41
43

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CONTENTS.

REPORT.

	PAGE
General considerations,	1
Appropriations,	1
Scope of the duties of commissioners,	1
Sea and shore fisheries,	1, 6
Fresh and cured fish and bait,	1, 4, 12, 17
Mollusk fisheries,	1, 5, 31
Lobster industry,	1, 4, 31, 173
Recreation fishing,	1
Inland fisheries and propagation of game fishes,	2, 5, 44
Protection and propagation of useful birds and mammals,	2, 55
Enforcement of fish and game laws,	2, 71
To furnish information,	3
Sea fisheries,	6
Statistics of annual yield,	6
Methods of marketing,	10
Sail *v.* power,	10
Disasters,	13
High liners of the fleet,	14
Herring, winter herring fishery at Newfoundland,	17
Cod,	22
Mackerel,	24
Total catch in North American waters, 1900–05,	27
Halibut,	28
Pollock,	28
Whiting,	29
Inspection of fish,	29
Dogfish,	29, 97
Seaweeds,	29
The Powder Hole reservation,	30
The lobster fishery,	31, 173
The shellfish industries,	31
Clams,	34
Scallops,	37
Quahaugs,	41
Oysters,	43
Inland fisheries,	44
Change of regulation of fisheries in ponds stocked later than 1904,	44
Pollution,	45
Game fish,	46
Shad,	46
State fish hatcheries,	48
Report from Sutton hatchery,	48
Report from Hadley hatchery,	52
Winchester and Adams hatcheries,	54
Fish not furnished for private purposes,	55
Mortality of fish,	55
Dams and fishways,	55

Digitized by Google

PAGE

Game, ... 53
A valuable asset of the State, ... 55
Ruffed grouse, ... 57
Forest fires, ... 58
Woodcock, ... 58
Quail, ... 59
Upland plover, ... 60
Pinnated grouse, ... 61
Shooting season, ... 63
Ruffed grouse reared in confinement by Prof. C. F. Hodge, ... 65
Propagation of birds and mammals at Sutton hatchery, ... 69
Propagation of birds and mammals at Winchester hatchery, . . . 71
Fish and game laws and their enforcement, ... 71
Summary of, ... 71
Classification of arrests, ... 72
Purposes of the game laws, ... 76
Obstacles to enforcement of game laws, ... 78
Killing of birds for millinery purposes, ... 81
Sunday hunting, ... 83
Smelt seining, ... 83
Work of the "Scoter", ... 84
New legislation recommended, ... 87
Courtesies, ... 91
Permits issued: —
For possession of egg-bearing lobsters, ... 92
For birds and eggs for special purposes, ... 92
For quail for propagation, ... 92
For sand eels for bait, ... 92
For pound net in Buzzard's Bay, ... 93
For taking lamprey eels for scientific purposes, ... 93
Report upon the damage done by dogfish to the fisheries of Massachusetts, . 97
Scope of the report, ... 97
Habits and life history, ... 99
Food, ... 102
Breeding habits, ... 102
Extermination impracticable, ... 103
Nature and extent of damage by dogfish, as indicated by special reports, . 103
Dominant species, ... 152
Causes of increasing numbers of dogfish, ... 152
Various methods which have been suggested for checking the incursions of dogfish, ... 154
Development of an economic demand for dogfish, ... 155
The dogfish reduction works at Canso, N. S., ... 156
Similar plants elsewhere, ... 158
Dogfish as food, ... 159
Other commercial possibilities, ... 161
Conclusion, ... 167
Report upon the lobster fisheries, and the causes of their decline, . . . 173
Is the lobster actually threatened with commercial extinction, . . . 173
Condition of the fisheries elsewhere, ... 177
Causes of the decline, ... 181
Conditions introduced by man responsible, ... 182
The increased demand, ... 182
Lobster meat problem, ... 186
Effect of the present laws, ... 190
Methods of protecting adult lobsters, devised in Cape Breton, . . . 192

Digitized by Google

PAGE

Report upon the lobster fisheries, and the causes of their decline — *Concluded.*

Legislative action which seeks to increase the reproductive capacity of the lobster must protect the adult, ... 197

Legislation should adequately protect the lobster from its enemies, . . 199

A close season, — advantages and objections, ... 200

Results under the present 10½-inch law, ... 203

Proposed new law, ... 204

The proposed law combines close season and 9-inch law, ... 213

Would increase the number of eggs produced, ... 213

Would improve the quality of eggs produced, ... 213

Objections, ... 213

APPENDICES.

A. Lists of commissioners of fisheries and game in the United States, . . 217

B. Distribution of food fish, ... 224

C. Distribution of pheasants, ... 231

D. Distribution of Belgian hares, ... 233

E. Arrests and convictions, ... 234

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Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

The Commissioners on Fisheries and Game respectfully submit their fortieth annual report.

General Considerations.

Appropriations. — The total amount appropriated and available for the various branches of the work for the year 1905 was $52,165. The distribution of the various amounts is definitely fixed by law. In general, $9,000 was designated for use in connection with the sea and shore fisheries; approximately $5,700 was used for the benefit of the inland fisheries and game, in the propagation of fish, pheasants and hares, and the stocking of ponds, streams and covers; approximately $26,000 was expended in enforcement of law, both on land and on the sea coast; for salaries of the commissioners, $5,620; and approximately, $3,500 for printing, postage, clerical and office expenses, and travelling expenses of the commissioners. The exact details of expenditures are to be found in the report of the Auditor of the Commonwealth.

Since 1866, when this department had its origin in the necessity for the protection of the fisheries of the Connecticut and Merrimac rivers, the scope and importance of the work of the department has steadily increased. Under its consideration now come: —

(*A*) The sea and shore fisheries: (1) fresh and cured fish and bait, yielding to the first handlers over $5,000,000; (2) the mollusk fisheries (clam, scallop, quahaug, oyster and "winkles," yielding over $500,000; (3) the lobster industry, producing in 1902 1,005,367 pounds, at about 11 cents per pound, valued at about $109,725, and in 1905 approximately 500,000 pounds (426,471 lobsters), at about 18 cents per pound, valued at over $95,000, — a total from the ocean of

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$5,704,000 at first hand, or upwards of $15,000,000 in the hands of the consumer; (4) the recreation sea fishing (notably in Buzzards Bay), which is capable of very great development.

(*B*) The inland fisheries, covering the maintenance of the remnants of the fish which our ancestors wisely deemed should belong to all the people in common, but unwisely destroyed in incredible wastefulness. It is our aim to care wisely for this heritage which our fathers so ruthlessly slaughtered and wastefully dissipated.

(*C*) In a similar way it is our province to protect the few survivors of our formerly abundant game birds and mammals. The wild turkey and the passenger pigeon, the great auk and the "rafts of duck" are gone forever. But by careful consideration the grouse, quail and beneficial birds can not only be maintained, but increased beyond present numbers, thus guaranteeing to the farmer and to the suburban resident the best possible protection against insects injurious to vegetation, and as well against mosquitoes, midges and such annoying pests as are the food of martins, swifts and swallows.

For the direct benefit of the rural population, both permanent and transient, every possible effort should be directed to maintaining and increasing the beneficial, particularly the insectivorous, birds, together with the game birds, notably the quail. For their contribution to healthful sport the grouse family should be increased. Above all, the responsibility of the hunter should be determined. The hunting license now required for unnaturalized, foreign-born inhabitants has done this in a considerable measure. Its more obvious limitation is found in the small number of paid deputies which can be employed for patrol duty.

(*D*) To this department is entrusted also the enforcement of the fish and game laws, except in the waters of Buzzards Bay, patrolled by the State police boat "Lexington." The enforcement of fish and game laws is notoriously difficult, and demands much special knowledge, careful observation and rapid, accurate judgment. Our aim is to secure a "square deal" for the farmer, the sportsman, the public and the game.

The detailed reports upon these various branches of our work follow under the separate heads.

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This department further is daily called upon to furnish information to individuals, to corporate interests, to representatives of foreign governments, to the members of our State Legislature or to the national authorities at Washington. Especially under the direction of our late honored chairman, Capt. J. W. Collins, many facts of economic biology which have been of great commercial value have been very successfully pointed out to our citizens. We trust that these efforts may be sustained.

The most serious handicap upon the work of the commissioners is perhaps the cramped quarters of our single room. Lack of space compels the storage at Winchester of the records of work of previous years; three desks and a stenographer's table leave scant accommodations for the necessary correspondence files, books of reference, specimens, etc. There is not standing room within when all the regular deputies are present. Important work is at the mercy of all sorts and conditions of interruption, so that in this room it has become absolutely impossible to despatch in a satisfactory manner the large amount of routine work which has become necessary, not to mention the special investigations which must be carried out. The seclusion necessary for the rapid and correct disposal of business matters cannot be maintained in the present quarters, to which all persons have direct access. Our late chairman was compelled to establish a private office and work room outside the State House. The present chairman also has found this necessary.

It is a source of satisfaction to note that the efficiency of enforcement of the game laws has been notably increased this year. Unsatisfactory reports have been decidedly less frequent, and those which have been received can be directly traced to: (1) an insufficient number of paid deputies to properly cover the territory; (2) an undeveloped public spirit, which does not forcibly condemn an offence against public property (*e.g.,* fish and game), though vigorously suppressing similar offences against private property; (3) material and verbal defects in certain fish and game laws; (4) a misconception of the fact that this commission does not longer enforce the Sunday fishing laws.

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Four of our unpaid deputies have proved recreant, and have been removed. Several have resigned, voluntarily and otherwise.

The commission made a personal investigation of the conditions connected with the winter herring fishery in Newfoundland, in which many Massachusetts vessels engage. All sorts of rumors surrounded the situation. Many Gloucester owners hesitated to send vessels to the treaty coast for herring. The lack of definite information was an effective check upon Yankee enterprise. Upon our return from Newfoundland at North Sydney, Cape Breton, October 12, we had a conference with the masters of the Gloucester fleet, and made known to them the results of our visit to St. Johns, Bay of Islands and other ports and fishing grounds of Newfoundland. We informed them that it was, in our opinion, not within the power or intention of the Newfoundland authorities to interfere with the American rights of fishing on the treaty coast; but that Newfoundland authorities did intend to limit the Americans definitely and strictly to the treaty coast and to the provisions of the treaty, for the purpose of securing to the Newfoundland merchants the pecuniary benefits of the Newfoundland fisheries. In the past the profits have gone to the Newfoundland fishermen and to the Gloucester and Nova Scotian vessels, to the practical exclusion of the Newfoundland merchant. These merchants are now playing the political game for the purpose of securing a share in this trade, which is at present valued at not less than $500,000 per annum to Massachusetts, and is capable of almost indefinite development.

The commission has made a personal investigation of the lobster industry of the Maritime Provinces and Newfoundland. From the Straits of Belle Isle to St. John, N. B., the evidence and testimony are upon the following points indubitable. Similar reports have been received from Maine, but as yet we have no first-hand knowledge. The average size of the lobster is annually diminishing; the number caught is less; the price is increasing; the number of pots required to supply the demand is greater; to secure a supply, a wider area must be fished; the average catch per pot is less. A constantly increasing number are being marketed, either entire or as meat. Small

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lobsters, 8 to 10½ inches, are most satisfactory for eating; they sustain transportation, and reach the market for live lobsters in better condition. Small lobsters are most desirable for canning. The idea of *protecting the adult and marketing only the immature* is spreading. It is now seriously opposed only by persons whose business may be adversely affected (though it is probable that such would prove but temporary), and by the apathy of those who fail to realize that the formulation of the proper lobster laws cannot be left to persons whose sole aim is to make money from the sale of lobsters, without reference to the future supply. The arguments are given on page 190.

The commission has made a personal study of the damage inflicted on the fisheries of this State by dogfish, the results of which are set forth in a part of this report which has also been published separately. (See pp. 95–169.)

Consideration has been given to the shellfish industries of the State, for the purpose of ascertaining the productive capacity of the areas under present conditions inhabited by scallops, clams, quahaugs and oysters, and of advising upon the adoption of the best methods of utilizing and increasing the productive capacity of these areas.

We have definitely ascertained the causes and conditions of the decline of the scallop industry of the State, and have made important recommendations concerning the regulation of the industry. (See pp. 37–41.)

Attention is called to the fact that with our present facilities it is not possible to rear sufficient trout fry and fingerlings to satisfactorily stock the public streams. (See p. 44.) An up-to-date hatchery, with adequate rearing pens, is imperatively needed.

The standards set and maintained by our late honored chairman shall not be lowered, and his words shall still apply: "It is the ambition of this commission to secure the largest results in the public interest for the outlay made. . . . The commission is not cognizant of a single dollar that has been misspent. We hope to merit the continued confidence in the satisfactory and economical disbursement of public moneys."

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Sea Fisheries.

Taken as a whole, this has been a very satisfactory season for the average deep-sea fisherman working for the general market.

The tendency toward the extension of "shack" fishing still continues. This practically accounts for the increasing quantity of fresh fish landed. The strength of the fresh fish market has led to the more thorough exploiting of our own fishing grounds.

The prices of marketable fish of all kinds through the year averaged $2.41 per hundredweight at Gloucester.

For the year 1905 the total quantity of fish of all kinds landed at Gloucester was 112,459,818 pounds, as compared with 103,528,924 pounds in 1904.

The production of fresh fish during 1905 was a record one. The total number of fishing craft coming to Boston in 1905 was 544. Of this number, 368 were vessels and 176 boats of various kinds, — gasolene boats, launches, etc. The number of trips made was 3,832 in 1905, compared with 4,056 in 1904.

Over 100,000,000 pounds of fresh fish were landed in Boston during 1905, which is a record. The increase was largely in fresh haddock. There was also an increase in halibut and other kinds, but a falling off of 2,000,000 pounds in hake over 1904. The total number of pounds of fresh fish of all species landed in Boston in 1904 was about 86,000,000.

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Catch of Gloucester Vessels.	1905.		1904.		1903.	
	Barrels.	Pounds.	Barrels.	Pounds.	Barrels.	Pounds.
Salt cod,	–	18,139,000	–	22,514,600	–	28,371,000
Fresh cod,	–	11,281,060	–	11,564,000	–	9,410,000
Halibut,	–	2,324,700	–	1,970,000	–	3,205,000
Haddock,	–	13,694,190	–	7,274,400	–	3,387,000
Hake,	–	13,517,315	–	11,342,400	–	5,614,900
Cusk,	–	6,895,830	–	4,128,200	–	1,593,000
Pollock,	–	17,637,535	–	8,964,400	–	5,017,700
Flitched halibut,	–	453,578	–	742,000	–	652,000
Fresh mackerel,	2,284	456,800	3,240	648,000	3,174	634,800
Salt mackerel,	26,050	5,210,000	25,053	5,010,600	40,161	8,032,200
Fresh herring,	7,257	1,451,400	8,735	1,747,000	10,076	2,015,200
Salt herring,	38,350	8,633,800	74,097	16,894,116	46,918	10,697,304
Frozen herring,	27,752	5,550,400	22,825	4,565,000	19,940	3,988,000
Swordfish,	–	23,240	–	121,100	–	22,325
Cured fish,	–	4,754,370	–	3,436,608	–	2,553,600
Frozen squid,	–	–	–	–	–	100,000

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Catch of Gloucester Vessels.	1905.		1904.		1903.	
	Barrels.	Pounds.	Barrels.	Pounds.	Barrels.	Pounds.
Porgies,	1,226	245,200	1,636	327,200	–	–
Halibut fins,	217	43,400	252	50,400	240	48,000
Whiting,	4,200	840,000	3,000	600,000	–	–
Shad,	–	8,000	330	66,000	–	–
Salt alewives,	–	–	1,000	200,000	–	–
Fresh alewives,	–	–	380	76,000	–	–
Fresh fish from boats,	–	900,000	–	600,000	–	1,750,000
Miscellaneous,	–	400,000	–	800,000	–	778,000
Total landed at Gloucester,	–	112,459,818	–	103,528,924	–	87,843,029
Total landed by Gloucester vessels at other ports direct (estimated),	–	44,650,000	–	31,776,000	–	36,900,000
Total landed at Gloucester and by Gloucester vessels at other ports,	–	157,109,818	–	135,304,924	–	124,743,029

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Total Catch (in Pounds).

Species.	1900.	1901.	1902.	1903.	1904.	1905.
Fresh cod,	34,051,392	35,972,524	36,373,316	30,557,215	30,635,979	36,137,281
Salt cod,[1]	–	–	–	–	–	–
Fresh haddock,	28,235,850	28,930,241	38,395,314	40,338,852	47,508,663	65,897,085
Fresh pollock,	5,277,824	2,193,800	12,579,588	3,308,510	7,984,292	20,409,516
Salt and cured haddock,[1]	–	–	–	–	–	–
Newfoundland frozen herring,	3,229,000	1,718,800	2,637,500	3,097,200	2,723,900	6,882,080
Newfoundland cured herring,	7,001,000	10,029,600	10,023,000	7,886,600	16,098,460	8,568,616
Salt ground fish,	51,128,896	47,319,664	52,980,480	43,049,216	49,296,240	49,221,200
Totals,	128,923,962	126,164,629	152,989,198	128,237,593	154,247,534	187,115,778

[1] Included with salt ground fish.

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Methods of Marketing. — Up to the present the sea fish supply has been so abundant and readily accessible that comparatively little attention has been given to developing apparatus for capture, or to devising improved methods of handling for market. The market for quantity already exists, and the demand for quality is increasing. The call for improved technique in marketing fish is thriving. Mark the increase in special brands, in retail markets arranged with particular reference to cleanliness, attractive methods of display, etc. So, too, the wholesalers, the owners and the masters of vessels must prepare to meet this demand for quality, in addition to quantity.

Sails v. Power. — The first and most important feature, the reduction of time between the actual catching and the table of the consumer, is being met by the increased adoption of power boats. The romance of the fisheries is rapidly departing. The up-to-date Captains Courageous now no longer brave the storm in sail-driven boats, but escape the peril by the aid of power-driven craft. Not alone is human life safer (if proper precaution is observed concerning fire), but more regular connections can be made with daily express trains and steamers, by which the day's catch can be in the Boston or New York market in the morning following the catching. The longer time upon the fishing grounds means more fish. The better condition of the fish means higher prices. Less labor at the oars is necessary in case of unfavorable winds. And, finally, the year's total profit, barring accident, is certain to be a handsome excess over that of the sailing craft under identical conditions. Instances are not uncommon on our coast where a boat, when equipped with a suitable "auxiliary" engine and screw, has yielded an increased profit of $5,000 or over.

In a similar way, as the power dory and the mastless power launches are replacing the picturesque sailing dories and "sprit-sails" for shore fishing, the fishing steamer is destined to drive out the beautiful schooner. But the same sturdy genius and courageous enterprise which has made the Massachusetts fishing schooner, with her yacht-like lines, the superior in speed and safety of all other fishing craft, still exist to make the Massachusetts fishing steamers safer for the crew, more productive

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to the owners, and, by being more speedy in the dash for the market, give better service to the public.

With the building of larger and speedier vessels the importance of taking advantage of favorable market conditions is increased. The development of wireless telegraphy promises increased usefulness when it can be utilized to direct vessels to a favorable market. So, too, it may become possible by wireless telegraphy to acquaint other vessels of the presence or absence of fish or bait in definite localities, thus reducing the cruising expenses and increasing the number of trips possible during the season.

Yet it cannot fail to bring a pang of regret to lovers of the beautiful on the sea that the realm of romance should be thus invaded by the rampant spirit of utilitarianism, and to think that in a very few years the graceful fishing schooners of Massachusetts may meet the fate which is already overtaking the sailing craft of the Great Lakes.

The "Nautical Gazette" says: —

> In spite of the fact that practically all steam crafts, even those in the lumber trade, are finding enough to keep them busy, there are dozens of schooners at ports on Lake Michigan which have not been under sail with a cargo this season. There are more which have made a trip or two since April, but most of them are now compelled to lie at their docks and dry out their seams under the rays of a torrid sun.
>
> The day of the sailing craft as a factor in lake transportation has certainly passed, and complaints of dull times among their owners a year or two ago are doubled during the present season.
>
> In former years the schooner found various means of employment, carrying alabaster, pig iron, slabs, pulp wood, cement and many other commodities, but they have none of these to fall back on now. The steamer has taken their place in practically all. There is some hope of the schooners having something to do later, but the prospect of their owners laying up a profit for the season is decidedly meager.

There is, however, little reason to believe that such a development in the fishing industry means decadence to the superbly daring seamanship of that hardy race which in our national life has contributed so notably of valor in war and of sturdy industry in peace; nor does it by any means follow that the wage-earning capacity of the crew should be diminished. It is but another instance of machinery replacing hand labor.

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The almost universal economic experience is that such is, on the whole, beneficial. The doom of the fishermen is not yet!

It should be noted, however, that the conditions under which the market fishery is carried on in Massachusetts are not identical with those of the market fisheries as carried on in Germany or England. The more notable points of variance appear to be: (1) the ocean bottom, which may tend to make European methods of trawl fishing less satisfactory here; (2) on account of the greater speed of our fishing vessels and the proximity of our fishing grounds to the market, as compared, for example, with those of the North Sea, fishing steamers in the Massachusetts fresh fisheries would seem to have less advantage over sailing vessels than is the case in European waters.

The iron steam trawler "Spray," built upon the model of the Grimsby trawlers, went into commission early in December. She is the pioneer otter trawler in American waters. She was built by the Fore River Shipbuilding Company, and is owned by a local company organized by local capital. She is especially interesting as an example of the advanced type of fishing vessel and of fishery methods which long experience and a heavy market demand has evolved in other waters. The success of the otter trawling method in the New England fisheries may revolutionize the fishing industry on this side of the Atlantic as it has on the North Sea.

Apart from the difficulties necessarily connected with the application of new methods to new conditions, there appear certain advantages. Among others are: (1) the possibility of fishing in wind and sea when a dory could not live; (2) independence of bait supply, and fishing can be prosecuted day and night; (3) the risk of tending trawls and separation from the vessel is eliminated.

The discussion of the Hay-Bond treaty and of questions connected with it — *e.g.*, reciprocity, continental free trade, protection of the salt fish industry of Gloucester, the dependence of Massachusetts fishermen upon Newfoundland bait, the rumors of retaliatory measures, prohibition of fishing, seizure of vessels, raising a higher tariff wall against imported fish and fish products — have happily led to no inconsiderate actions. The events and the discussion of conditions have called atten-

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tion to the reciprocal advantages of a minutely complete understanding of the problems. In a similar manner it has been demonstrated that present conditions are not altogether satisfactory. There have been times in the past three years when it would have been to the great financial advantage of Massachusetts vessels to be able to procure squid, herring and capelin in Newfoundland. So, too, there have been times when our vessels might have carried bait (*e.g.,* squid and sand-eels) or even several kinds of readily portable merchandise (*e.g.,* oil clothes, boots, shoes and rubbers, etc.) to Canada and Newfoundland, to advantage of the people of both countries. Obvious results of the defeat of the Hay-Bond treaty appear in the greater development of the bait fisheries of Massachusetts; the extension of cold-storage and freezing plants; the development along the Nova Scotia coast, notably at Canso, of cold-storage establishments, where squid and herring can be bought by vessels from all ports. Thus the keen business sense of the Nova Scotian merchants, aided by the wise consideration given to the development of the trade by the Canadian Department of Marine and Fisheries, seems likely to acquire much of the money formerly paid to the individual Newfoundland fishermen distributed in small groups along the southern and eastern shores of that island. Many of these fishermen have in years past each "baited" annually upwards of 10 "Yankee" vessels at $40 per baiting; and the loss of this money falls heavily upon a people who have practically no other source of ready cash. Instances where our fishermen have lost an unusual amount of time or money through the curtailment of baiting privileges at Newfoundland harbors are very infrequent, and do not warrant serious consideration. Personal contact with the Newfoundland fisherman at his own home convinces us that an unduly heavy burden has been cast upon him, rather than upon the Massachusetts fishermen or upon the consumers of fish in the United States, as the Newfoundland government and merchants have hoped and expected.

Disasters. — As a direct result of the development of an improved type of larger and stauncher fishing vessels (of which the "Grampus," designed by our honored late chairman, Captain Collins, was the pioneer), for two consecutive years not a

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single fishing schooner has foundered, and no wrecks have been attended with loss of life. The deaths from exposure have been lessened from the development of the practice of supplying the dories with food and water, so that in the event of missing their vessel the men have an improved chance of being picked up or of rowing to land. With the increasing custom of fishing over wider areas, the loss from collisions has decreased. Of the total of 11 vessels destroyed, 3 were lost (all loaded and homeward bound) last winter while engaged in the Newfoundland frozen herring trade. The crew were saved; vessels and cargoes total loss. Schooner "Golden Hope" sprung a leak and sank off Bay of Islands, N. F.; schooner "Bessie M. Devine" went ashore and caught fire at Whitehead, N. S.; schooner "Edward A. Perkins" went ashore at Louisburg, Cape Breton. Three of the Gloucester banking fleet were also lost, but happily the crew were saved. Schooner "Hazel Oneita" went to pieces on a ledge off Cape Sable, N. S.; schooner "Puritan" misstayed and was a total loss on Stag Rocks, near Canso, N. S.; schooner "Columbia" run down and sunk by steamship "Sverra" off North Sydney, Cape Breton. Of the other 5, schooner "James Driner" struck on Romer Shoal; the gasolene boat "Columbia" burned off Block Island; schooner "Alice S. Hankes" caught fire from explosion of the binnacle lamp; schooner "Clara" sank off Point Judith; schooner "Veteran" sank off Wood Island, after going ashore off Cape Elizabeth, Me.

The total loss of life was 21, including 3 men drowned at the wharves while attempting to board their vessels, 6 who died on shipboard or in hospitals after landing, and 1 who was drowned in his dory as the result of an epileptic fit. Seven widows and 10 orphan children were left. The total value of vessels and outfit was $74,350; insured for $44,259.

High Liners of the Fleet. — The fishing year just closing has, all in all, been a successful one. Good catches have been made, and generally high prices realized. Some of the salt bank cod fishermen have made extra large season's works, and this in spite of the fact that they were denied the usual baiting privileges at Newfoundland. It is the opinion of the leading salt banking captains that they have done as well, if not

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better, than if they had the privilege, and their bait bills have been less by many hundreds of dollars.

The high line of the salt bank fleet was the trawling schooner "Elector," Capt. Clayton Morrissey, who also held the honor last year and in other years. The "Elector" made two trips, starting in March and closing her season early in November. On her first trip she weighed off 291,000 pounds of salt cod, stocking $9,735, the crew sharing $225. On her second trip she weighed off 226,000 pounds of salt cod, stocking $9,527, the crew sharing $231.80. Thus for the season she landed 517,000 pounds of fish, stocked $19,262, and the crew made $456.80 each.

Another excellent record was that of schooner "Aloha," Capt. John McInnis, also in the trawl salt bank cod fishery. On her first trip she weighed off 183,000 pounds of salt cod, stocking $5,623.56, the crew sharing $92.79. On her second trip she landed the biggest fare of the season, 305,000 pounds of salt cod, stocking $12,753.12, — the highest stock for the year for a trawling salt banker on a single trip, and also one of the best on record; the crew shared $266.59. For the season the "Aloha" landed 488,000 pounds of salt cod, stocking $18,376.68, the crew sharing $359.38.

Another fine season's work was that of schooner "Independence II," Capt. Joseph V. Cusick, also in the trawl salt bank cod fishery. On her first trip she weighed off 281,000 pounds of salt cod, stocking $8,864.35, the crew sharing $151.07. On her second trip she weighed off 216,000 pounds, stocking $9,249, the crew sharing $171.76. Her catch for the season was 497,000 pounds, the stock $18,113, and the share of each man $322.83. The share was not so large in proportion as that made by some of the other crafts, because, where most of them carried 9 dories, or 20 men, this craft had 10 dories, or 22 men.

Schooner "Arbitrator," Capt. Wilson Spinney, also made a fine season's showing, and probably the best of any of the trawl salt bankers carrying 8 dories, or 18 men. On her first trip she weighed off 229,000 pounds of salt cod, stocking $7,721.16, the crew sharing $181. On the second trip she had 214,000 pounds of fish, stocking $9,537.43, the crew shar-

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ing $242.42. For the season she landed 443,000 pounds of salt cod, stocking $17,258.59, the crew sharing $423.42.

The high line of the dory hand-lining salt bank fleet was schooner "J. J. Flaherty," Capt. Fred Le Blanc. On her first trip of the season this craft weighed off 151,000 pounds of salt cod, stocking $5,500, and on the second trip she had 294,000 pounds, stocking $12,960, — the largest stock on a single trip for the year for either trawlers or dory hand liners, and also one of the largest on record in the dory hand-line fishery. On this latter trip the high liner of the crew earned $325. For the season the "Flaherty" landed 445,000 pounds of salt cod and stocked $18,460.

Schooner "Gladiator," Capt. Joseph Spinney (his first trip as skipper), on a single trawl salt bank cod-fishing trip, weighed off 260,000 pounds of salt cod, stocking $10,259, the crew sharing $314.

Of the flitched halibut fleet, which fishes the far northern waters of Bocalieu Bank and Davis Strait, the schooner "Arbutus," Capt. Charles Fleggore, was high line. The vessel weighed off 90,208 pounds of flitched halibut and 34,830 pounds of salt cod, stocking $7,517.92, the crew sharing $182.92.

The leader of the Georges halibut fleet was schooner "Kineo," Capt. John Stream, which from April to October 20 stocked $20,403, the crew sharing $606.15 each. Captain Stream has been high line of this fleet for several seasons.

Schooner "Squanto" of Duxbury, Capt. Daniel McDonald of Gloucester, is credited with being high line of the bank halibut fleet, with a stock of $22,000.

Schooner "Tacoma," Capt. Adelbert Nickerson, has also done well in this fishery, stocking a little over $20,000.

Schooner "Agnes," Capt. James Goodwin, and "Cavalier," Capt. Robert Porper, have each stocked $14,000 since April in the bank halibut fishery.

The attempt at seining codfish in the vicinity of Sable Island was made again this year. Schooner "Tattler," Capt. Alden Geel, and schooner "Emma E. Witherell," Capt. Thomas Benham, sailed from here April 6, the former returning July 1 and the latter June 25. Both fished with purse seines. The

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"Tattler" had 376,000 pounds of salt fish and the latter 283,000 pounds. Unfortunately, but few codfish were found in the shoal water, where they generally school on the smooth sandy bottom, and the greater part of each fare was pollock.

One of the best stocks made in the fisheries for the year was that of schooner "Lucania," Capt. Martin L. Welch of Gloucester. This vessel engages in mackerel seining in summer and haddocking in winter. Since her first trip of the season, haddocking, Oct. 14, 1904, to the close of her seining season, Sept. 19, 1905, she made the big stock of $39,030.33. Of this amount, $18,879.79 was made mackerel seining and $20,150.54 in haddocking.

Notable among those prosecuting the shore fisheries were: —

Schooner "Mary E. Cooney," Capt. Frank Cooney. From Jan. 1 to about Nov. 25, 1905: vessel's stock, $28,864.34; crew's share, $1,135.43.[1]

Schooner "Beldino T. Domingoes," Capt. Manuel P. Domingoes. From Jan. 1 to about Nov. 25, 1905: vessel's stock, $27,689; crew's share, $1,069.49.

But the high liner of the entire Massachusetts fleet was schooner "Mary C. Santos" of Provincetown, Capt. Manuel D. Santos, with a gross stock of $42,240.38, with 10 dories and a crew of 23 men. The crew's share was $1,071, from Jan. 9 to Nov. 29, 1905.

In October immense schools of cod appeared off the Rips of Monomoy. In November these struck off the Chatham shore in such numbers that during November and December over $50,000 worth of cod were taken by the Chatham people alone.

Similar conditions obtained at Provincetown.

Herring. — Herring, both fresh and salt, show a decided falling off in quantity and quality. The fall herring fishery both on Massachusetts shore and on the treaty shore of Newfoundland was a disappointment, on account of the scarcity of the fish.

In view of the value to Massachusetts of the Newfoundland herring fisheries, and in consequence of the lack of exact information here, with absence of reports which were certain to

[1] This vessel has made one trip since I received these figures, and stocked about $2,000. — W. W. NIXON.

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be untinged by reflections of personal interests, Commissioners Field and Delano were delegated by His Excellency the Governor to make a personal investigation for the purpose of securing first-hand information upon the winter herring fisheries in Newfoundland, in the interests of the Massachusetts fishermen. The commissioners recognized the importance of the question, and the nature of the peculiar circumstances which led to the present delicate situation.

They left Boston September 26, and on the return left Bay of Islands, N. F., October 13, arriving in Boston October 18. Their observations are embodied in the following report: —

To His Excellency WILLIAM L. DOUGLAS, *Governor of the Commonwealth, State House, Boston, Mass.*

SIR: — The chairman and Mr. John W. Delano, of the Massachusetts Department of Fisheries and Game, returned October 18 from Bay of Islands, St. Johns, N. F., and Sydney, Cape Breton. They have investigated the winter herring fisheries in Newfoundland, in the interests of the Massachusetts fishermen.

The conditions there have been extremely complicated; as a matter of fact, it is simply a game of chess. The purpose of the Newfoundland government is not alone retaliation for the rejection by the United States of the Hay-Bond treaty, excluding Newfoundland dried and salted fish from the United States ports, but is more directly for the purpose of controlling the Newfoundland fisheries in the interests of the Newfoundland merchants. If the Americans were not present as purchasers of fish, the product would be bought from the fishermen by the local merchants, and in general the fishermen would be paid in goods, or a small price in cash, somewhere from 65 cents to $1.25 per barrel. These local merchants, in turn, would sell to the shipping merchants, chiefly in St. Johns, who control sailing and steam vessels, as well as the sealing and the Banks fishing fleet. There are very few instances in Newfoundland where fishermen own the whole or a part of the vessel, as is the case in the United States and Nova Scotia. The general outline in which the ministry is endeavoring to push out the Massachusetts and the Nova Scotian vessels is shown in the following quotation from the St. Johns "Evening Herald:" —

A company will be formed with a capital of $100,000, in $50 shares, to be open to the public, every business man in the city contributing, but restricted to one-quarter of the entire capital. Vessels will be hired, our excellent banking fleet given the preference, and the winter herring fishery, both bulk, salted and fresh, will be conducted at the Bay of Islands, and the prices paid equal to any ever given by Americans, while the cargoes will be marketed at Boston and vicinity.

The government have been asked to enforce the act stringently, see that Americans conform to our fishery rules, and give them no opportunity to land; at the same time prevent our own people selling to them, no matter what inducements are *held out*. The company ask in return a small bounty, equivalent to 50 per cent.

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of duty paid on herring entering United States ports. This, it is thought, will enable our people to compete with the Yankees, and in fact prevent anything like the cargoes they have had in the past being obtained. Those interested request the government to do this for one year only, believing that it will more rapidly bring the Americans to their senses than anything else ever attempted. When the project was laid before members of the Executive by A. F. Goodridge, Esq., chairman, Hon. John Harvey, secretary, and the committee, the government asked for time, and have meanwhile wired Sir Robert Bond respecting the proposition, and are awaiting his reply. Until the promoters have received a definite answer, there can be no attempt to carry it to a conclusion. The idea appears to be a commendable one, and it will at least mean the distribution of a large sum of money among our fishermen, that, in the event of the law being enforced, without such would be lost to them and the revenue. The promoters fully realize what can be done, and those who were opposed to the Hay-Bond convention and the fisheries act of this year are now favorably impressed with this scheme, and, whether supporters or opposed to the government, are willing to help all in their power. If this is done, it will conclusively prove to banking owners they are just as able to conduct the herring fishery as our American friends; and, instead of having their craft lying up in November and December, can utilize them profitably in this work. It will strengthen the hands of the government, and all that is needed is another steamer with the "Fiona" to protect our people and carry out the law. The duty on herring going into the States in foreign bottoms is ½ of a cent. per pound on salt, and 1 on fresh; while it is estimated a capital of say $20,000 will be ample to carry out the business.

From the Newfoundland point of view it is rather a question of trade and of local politics, *i.e.*, the government and the merchants *v.* the fishermen, than the broader question involved in the Hay-Bond treaty, though each move of the "Yankee" is carefully watched, and a corresponding move to checkmate is prepared.

The attitude of the fishermen can best be understood from the statements made to us, of which the following is a fair example: —

Up to this past summer we have been selling bait to 10 or 12 vessels which have come to us regularly every year. We receive $40 cash for baiting each American vessel. This means from $400 to $500 every summer. During the past summer, however, no American vessels have been in for bait. The result is, we have had the bait on hand, and have been obliged to throw it away. This means a direct loss of $400 or $500 to every family in this harbor.

This same condition obtains all along the south, east and west coasts of Newfoundland. The recent decision by the Newfoundland ministry, that the fall and winter herring fisheries were included in the bait restrictions, was received with feelings of dismay by the individual fishermen on the treaty coast, notably at Bay St. Georges, Bonne Bay and the Bay of Islands. At the latter place the feeling is unusually strong, for the reason that the Nova Scotian and the Massachusetts fishing vessels have annually left in the hands of the fishermen, as a price of the herring and other supplies bought, not less than $100,000 in cash. The Bay of Islands is a series of advantageously located fishing hamlets, where the herring are caught in October and November within a cable's length of the fishermen's homes. The quantities are incredible, and a vessel may be loaded in a very few days, so that this $100,000 or more becomes available within six or eight weeks after the herring strike.

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The state of mind of the fishermen can best be gathered from the following quotations, from the "Western Star," published at the Bay of Islands October 11:—

Despite public and private agitation of the suspension of the bait act against Americans, the government still remain firm in their intentions to strictly enforce the law during the fall and winter herring fishery in Bay of Islands. The "Star" has endeavored to plainly state the position in which our fishermen are, and we have also pointed out the futility of enforcing the bait act. But no amount of persuasion seems to reach the heart of the government; and now our fishermen must console themselves with the knowledge that the herring fishery this season will not be prosecuted as formerly. They have been hoping against hope, with the expectation that the powers that be would see the wisdom of taking advantage of the suspending clause, and thus allow American vessels to secure cargoes in the same manner they have in years past. But no; our men must sit idly on the banks of the Humber, and watch the Americans taking herring from their doors. The fishermen say they are not going to allow this state of affairs to exist; for if the Americans are allowed to take their own herring, which they claim to have a right to do according to the treaty of 1818, and if they are willing to purchase from our men, they (the fishermen) contend that they are entitled to a share of the spoils. Two vessels are now in port, supplied with salt and nets, and have come prepared to do their own fishing, if our men are prohibited from fishing for them; and we learn that a great many vessels are fitting out at Gloucester to come here.

Our fishermen have become so indignant over this fishery question that a mass meeting of over 300 men was held Monday night in the C. E. Institute. The place was literally packed, and over a hundred were unable to gain admission. Mr. James Barry was called to the chair, and Mr. A. L. Barrett was chosen secretary. A free discussion took place, and every speaker expressed himself highly indignant with the government for keeping in force the bait act. A committee of 12 was appointed, and the following memorial was drawn up, which was telegraphed to His Excellency the Governor yesterday morning:—

"We, the fishermen of Bay of Islands, and others directly interested in the fall and winter herring fishery, at mass meeting assembled, do hereby memorialize that His Excellency the Governor in Council put in force the suspending clause as provided in the foreign fishing vessels act passed by the Legislature last spring.

"We do also protest against the request advanced by the merchants of St. Johns, as it would, in our opinion, put a premium on monopoly, and in the mean time does not safeguard our interests.

"We do further declare that the situation as at present is an outrage against those whom it should benefit; inasmuch that we are prevented from selling our herring to the Americans, while in the mean time Americans can come and catch herring themselves.

"If our requests are not granted immediately, we shall be compelled, in justice to ourselves and families, to seek other ways and means to engage with Americans.

"We would also direct the attention of His Excellency the Governor in Council to what took place in Fortune Bay a few years ago, when Capt. Solomon Jacobs seined herring against the wishes of the people, and the result. If a similar occurrence should take place here, who will be responsible?

"*Whereas*, In times past we have been ignored in our requests by the Colonial Government; we do hereby

"*Resolve*, That this memorial be telegraphed direct to His Excellency the Governor, trusting the same will be placed before his ministers without delay.

"We respectfully solicit an early answer, to avoid further trouble."

There are involved two distinct phases: (1) the Newfoundland government seeks to prevent off-islanders from buying herring and

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Fish houses and "flakes," Cape Broyle, Newfoundland.



"Toads Cove," a typical shore fishing village, Newfoundland.

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bait, for the ultimate purpose of (2) controlling the fisheries industries with Newfoundland capital, through the agency of its own population and vessels.

It is a fact that Massachusetts and Nova Scotian vessels have in the past hired the Newfoundland fishermen on the treaty coast to assist in catching and freezing the herring. This, from the Newfoundlander point of view, is tantamount to buying the herring, except in the one case the captains buy the time and labor, and in the other they buy the products of that time and labor.

We could find no grounds for the statement "that the 'Fiona's' commander has strict orders to seize any American vessel fishing in the Bay of Islands," and are of the opinion that such orders have not been given. On the contrary, we believe that the Newfoundland authorities are acting for what they believe to be the interests of Newfoundland as a whole, and hope to secure a wider market for the Newfoundland fisheries. The issue is distinctly and alone upon the question of markets, and how the trade shall be carried on, not upon the question of the rights of fishing under the treaty of 1818. The Newfoundland authorities seek to compel Newfoundland fishermen to deal with Newfoundland merchants, instead of selling direct to Massachusetts and Nova Scotian vessels. The St. Johns, N. F., "Telegram," October 10, says: —

> Two American schooners are here [Bonne Bay, N. F.], and both will respect the treaty, and are prepared to catch their own herring. Fishermen sent message to government this morning to explain their attitude. They seem determined to fish and sell herring, even if they have to take forcible possession of the American schooners to do so.

There can be no question that the bait act at present is far greater hardship to the Newfoundland fishermen than to the Massachusetts fishing vessels; while the refusal of the Newfoundland authorities to permit the purchase or sale of herring, or the hiring of Newfoundland fishermen to catch herring, or to assist Massachusetts crews in catching herring, falls with greater severity especially upon the communities at St. Georges Bay, Bonne Bay and Bay of Islands, whether the proposed Newfoundland company for shipping fish materializes or not.

The Massachusetts commissioners had a conference at North Sydney, October 14, with the captains of the Massachusetts vessels in the harbor, bound for Bay of Islands, and gave them the above information, at the same time advising that vessels come equipped with men and gear sufficient to catch fish without depending upon landing or upon the Newfoundlanders for fish or assistance. We also gave our opinion that it might be possible to ship men legally outside the three-mile limit, and thus evade the local regulations; but we strongly advised against such action, until this point had been ruled upon by the United States or English authorities. In spite of all the rumors of a demand for a Newfoundland license, and of seizure if such license were not procured, it did not appear possible to your commissioners for the Newfoundland authorities to nullify the rights actually guaranteed by the treaty, or to make any local regulations which would tend to do so. There is no evidence that the Newfoundland authorities contemplate the prohibition of fishing by

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Massachusetts vessels; but the intention is to draw the lines strictly to the guaranteed rights, *i.e.*, to enter harbors, bays, etc., to *catch* fish, and for the purpose of shelter, of repairing damage, or purchasing wood and obtaining water, *and for no other purpose whatever.*

The captains and crews expressed the opinion that all Massachusetts fishermen intended to respect the local laws and regulations to the letter while in Newfoundland waters. The following, from the Sydney "Daily Post," October 14, is a tribute to the fishermen: —

For the past week there have been between 75 and 100 fishing vessels anchored in the harbor, hailing principally from Gloucester and Nova Scotian ports. These floating homes contain in the vicinity of a thousand men, and a more law-abiding community it would be hard to find. Fishermen, when they get ashore, according to the general idea, are invariably prone to getting drunk and creating a disturbance, eventually landing in jail. The custodians of the peace have but five arrests to report in their seven days' watch on the movements of this transient population.

Still, the question is a complex one, and the next move on the chess board may bring in unforeseen complications. It is our opinion that, if the Newfoundland fishermen are not permitted to sell their herring, they will interfere with Nova Scotian and "Yankee" vessels catching herring in their own "front yards," so to speak; and seines may be destroyed under cover of darkness, in spite of the good offices of the "Fiona" and of the able representative of the State department and of the United States Bureau of Fisheries, Mr. A. B. Alexander, who is now at Bay of Islands. Realizing this, the captains of the fishing vessels at Sydney have drawn up a petition to the proper British authorities asking that a war vessel may be stationed at the Bay of Islands during the months of November and December. They recognize, of course, that the search lights are all that are necessary to preserve the peace.

At Halifax we had the privilege of meeting the Honorable, the Minister of Marine and Fisheries of Canada, and of asking his consideration of the expediency of stationing a British cruiser at the Bay of Islands during the winter herring season.

At the request of the Hon. Elihu Root, Secretary of State, we are forwarding to him a copy of this report.

Respectfully submitted,

GEORGE W. FIELD,
Chairman.

Cod. — The bank cod fishing fleet left about April 1. The denial of fishing privileges in Newfoundland waters other than those of the treaty coast, under the *modus vivendi* license system, caused some inconvenience to those who came unprepared with bait seines for catching their own bait. On receipt of the news, capelin nets were shipped to Nova Scotian ports, where they were put on board the vessels.

The early bank fleet therefore were somewhat delayed by failure to seine bait on the south and east coast of Newfound-

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A Newfoundland harbor.



Gloucester fishing vessels in Bay of Islands, Newfoundland, for fall herring.

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land, while the ice prevented access to the treaty coast and to the Magdalen Islands, where bait could be procured. It has become a custom for our banking vessels to call at Newfoundland ports to buy bait and to ship men. There were advantages to both parties. But it has proved that Newfoundland bait is by no means essential to Americans; on the contrary, it was a distinct advantage to us to be compelled to develop our own baiting facilities, and generally speaking abundant bait supplies were secured at a considerably less price than had previously been paid to the Newfoundland fishermen. This experience has led to such a development of our own baiting facilities that in the future we should be able under ordinary circumstances to provide for the baiting of the Massachusetts fleet, and in favorable bait seasons to sell bait to our less fortunate neighbors.

Though the general tone of the market has been at times unsatisfactory, particularly in the case of the Grand Banks fleet and of the mackerel seiners, the shore cod fisheries have been remarkably good, and prices both for fresh and salt fish have ruled very high, even to such a degree that upwards of 600,000 pounds of salted cod have come to our Boston market from the Pacific, and in addition an increased quantity of halibut has come to the Boston market by refrigerator cars from Vancouver.

On April 15, steamer "A. B. Nickerson" seined 40,000 pounds of cod off Wood End, Provincetown. This is claimed to be the largest lot ever taken in those waters with seines.

Similar reports of unusually good catches come from all the Rip fishing grounds on the Massachusetts shores, especially in the autumn. This strike came too late to be figured in the returns given in Appendix G. The great relative abundance of cod and other non-migratory fish close to our shores seems to point clearly to the success of the methods adopted by the United States Bureau of Fisheries, and to the practical value of the two United States fish hatcheries on the Massachusetts coast at Woods Hole and Gloucester. During the past year billions of cod fry have been hatched from eggs which would otherwise have been destroyed or been of slight practical market value. These fry from these eggs have been planted off our shores.

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Here seems to be the logical method of dealing with our fisheries. Depletion of the fishings, either local or general (or with some species both), is certain to follow as a result of increased demand, when the fishing methods are notoriously unwise, as in the case of the lobster at present. The true solution lies not in limiting the demand through prohibition of the use of certain apparatus, nets, traps, beam and otter trawls, etc., or of particular methods of fishing, but rather in developing methods likely to secure an increased supply of fish, such as artificial propagation, and the prohibition of fishing in certain areas where normal breeding may go on undisturbed by man. It would be exactly as logical to forbid the use of machines for planting and digging potatoes or other agricultural produce, or to forbid the use of cattle as food, or as a source of leather, etc., because the natural supply has become curtailed by human requirements. The true economic solution is the protection of the necessary number of breeding adults, to ensure an adequate supply of eggs, and the protection of the young up to a marketable size. The problem on land and sea is similar. Marine farming and grazing are coming necessities. The possibilities of development of animal food in the water is far greater than upon land. The only difference is, that on land our ancestors long ago met and conquered the difficulty. The next generation may be compelled to solve this problem of marine farming and grazing. We, as a race, are not familiar with the details of the first and greatest struggle in the development of agricultural methods by our forefathers, and therefore hesitate to attack the more novel but ultimately more profitable cultivation of the sea and its shores.

Mackerel. — The exceptionally warm weather of March aroused hope that the southern mackerel trip, a lottery at best, might this year furnish improved chances. By the last of March steamers reported large schools of mackerel off Hatteras. During early April the fleet were obliged by gales to seek harbor inside the Capes of Virginia, so that during the month of April few mackerel reached the market. One seiner landed 2,100 large, fresh mackerel, averaging about 2 pounds each, at New York, about April 26, which sold at 50 cents each in New York and 65 cents in Boston.

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The first mackerel from Massachusetts waters to arrive in Boston came from Chatham, on or about April 26, — a single specimen.

The catch of the New England fleet up to April 29 was 61 barrels, against 865 barrels in 1904, 8,331 barrels in 1903, 14,227 barrels in 1902, and 5,496 barrels in 1901.

Early in April the great school of fish appear with unfailing regularity off the Capes of Virginia. In this neighborhood they usually remain for three to five weeks, then practically disappear, to strike again off Fire Island, N. Y., where they usually remain perhaps two weeks. By the middle of May a large school may be expected off Block Island, and another large school passes eastward and strikes off the southern Nova Scotia coast. During May the best fishing is usually off Block Island and on Georges Bank, frequently extending inland to the shores of Cape Cod. Many of the seiners, in addition to the supply of ice necessary for running the fish fresh to market, carry salt and provisions, so that the fish may be shipped to Boston or New York from Newport, Woods Hole or Provincetown without the necessity of a stop to refit.

The following clipping from the Boston "Globe," August 18, well indicates the method of fishing during the summer, when the mackerel are off the coast: —

Woods Hole, August 17. The mackerel fishing boats, about 50 in number, that have been tied up here for the past two days on account of bad weather, got under way this morning for the fishing grounds.

The fishermen report the mackerel in big schools in the sound and off No Man's Land, and believe that the season will be one of the best for many years.

The fishermen from all along the bay shore and from the towns of the lower Cape and Provincetown and Wellfleet have joined the fleet here during the past week, and they are having the best luck for many years.

On Monday, which was the last day that the little catboats could stand the weather on the fishing grounds, several seiners put in their appearance, and the fishermen say that they are afraid the seiners will scare the fish, and that small boats will not get such big fares. In any event, the fishermen say that there are mackerel enough for all this year, and they are a happy lot.

They make daily runs to and from the fishing grounds, landing at the dock here, where Capt. John Nagle, well known all along the Atlantic coast among the fishing fleet, takes them and prepares them for market.

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In this way the fishermen are able to land their fares early in the evening, then turn in and get a little sleep before they start out for the fishing grounds at 3 in the morning.

Sixty-eight barrels were landed here one day last week. This was the record for one day thus far this season, but the best fishing days are yet to come, so the fishermen say, and they expect that the record will be no less than 200 barrels, or even twice that number if they get a whole day of good weather. Many of the catboats have power in them, and these make quick time to and from the fishing grounds, regardless of the weather conditions.

"Dave Nickerson," who was high line two years ago, and who came near being lost in the ice pack last winter off Monomoy Point, the life savers at great peril rescuing him from his little yacht, is here; also Capt. Walker Harding of Wellfleet, formerly a surfman at Cahoon's Hollow United States life-saving station.

The fishermen here are all expert mackerel catchers, and their opinion as to the season's catch is that it will be one of the best for many years. Capt. Harry Curry of Monument Beach is also with the fleet here.

On June 28, 29,000 mackerel, a record-breaking number, were landed at Newport, R. I., by the auxiliary schooners "Salada" and "Mary Z. Harty," both of Gloucester. The "Salada" brought 14,000 and the "Harty" 15,000.

The high liner of the mackerel seining fleet was Capt. Thaddeus Morgan of the schooner "Constellation," who completed his season's work September 21. His vessel stocked the magnificent total of $38,000, and the crew's share per man was $785.68. These are both seining records of the season. These records have been excelled but once in the history of Massachusetts mackerel seining, when Capt. Solomon Jacobs set the high-water mark by stocking over $40,000.

As a whole, both the years 1904 and 1905 have been lean years for our mackerel fishermen. The comparative totals are given below. The price has averaged higher than last year. A larger number of vessels have participated in the catch, and there has been a more equal division than in former years. While the year has been a disappointing one to the netters, the Cape shore salt catch was the largest for years. There was a large showing of mackerel on Georges, but it was reported that very few schools were stopped. All along the shore large quantities of "tinkers" appeared, which the fishermen believe to be a favorable prophecy for next season's catch. Thus we may hope that 1906 may furnish a full season's catch, and that it may not be necessary for so many of our best men and

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vessels to abandon the mackerel fisheries early in September, as was the case this year, on account of poor fishing.

The aggregate catch of mackerel in North American waters for the past six years is as follows: —

Total Catch of Mackerel in North American Waters, in Pounds, for the Years 1900–05, inclusive.

	1900.		1901.	
	Salt.	Fresh.	Salt.	Fresh.
United States, .	17,593,400	9,885,600	13,478,200	10,417,200
Canada, ...	14,087,200	5,475,800	13,789,800	4,089,200
	1902.		1903.	
	Salt.	Fresh.	Salt.	Fresh.
United States, . .	9,106,800	13,756,200	8,878,400	14,129,200
Canada, ...	6,948,400	3,535,800	12,959,800	7,470,200
	1904.		1905.	
	Salt.	Fresh.	Salt.	Fresh.
United States, . .	5,794,600	9,360,400	5,818,000	9,980,400
Canada, . . .	2,400,000	1,201,800	2,240,000	1,752,600

Total catch of fresh and salt mackerel, 204,149,000 pounds, divided as follows: New England fleet, 128,198,400 pounds; Canadian fleet, 75,950,600 pounds.

It is worthy of serious consideration whether or not the supply of mackerel is declining.

In general terms it seems unlikely, for the reason that the total catch in the relatively small section of the vast oceans inhabited by this swiftly migratory fish must be inconsiderable, when compared with the total number of individuals. In case of the mackerel, we are dealing with a fish which traverses practically every part of the North Atlantic, — not one

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which is distributed over a limited area, as is the fact with the lobster; nor are we lying in wait for a species which resorts annually to special, well-defined and readily accessible breeding places, as do the shad, salmon and alewives, where the adults just at the time of egg laying are captured in great numbers for market.

Nevertheless, the catching of adult breeding fish wherever found, and the young "tinkers" in the fall of any size whatever, by the combined American and European fleets, must in time cause the inevitable decline. If it has not already appeared, it is due to the vastness of the ocean and the countless numbers of the mackerel.

Halibut. — For the past few years the Boston market has depended almost entirely upon the Pacific fresh halibut supply. The Atlantic halibut fleet has greatly diminished. This year the smallest fresh halibut fleet for many years brought to market 2,324,700 pounds, — an increase of 400,000 pounds over last year.

The flitched halibut fleet did poorly. From a fleet of nearly 70 sail and an annual catch of upwards of 20,000,000 pounds, the Massachusetts halibut fleet has dwindled to 12 or 14 vessels and about one-tenth of the former catch. The cost and hazard incident to bringing fish from these far-distant fishing grounds is too great to meet the competition resulting from the proximity of the Pacific halibut banks to the railroad termini on the Pacific coast. The abundance of fish and improved methods of transportation and refrigeration have won the market.

Pollock. — The pollock catch has been the best on record. Though the banner trips have been made during the autumn fare, from September to December, these fish were reported in great abundance in the early spring. The following report from Provincetown indicates the conditions there during April: —

Provincetown, April 17. Nearly 500,000 pounds of pollock have been taken in Provincetown harbor during the last five days. Boston's fresh pollock market has been glutted by the catch. During the past three days the fish have appeared along the entire harbor front, and seem increasing in numbers.

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It is a source of great surprise that so few inland fishermen, who enjoy the song of the reel, should be ignorant of the gamy strength, active nature and fighting courage of the pollock. There is no more certain chance for sport than fishing for pollock at Provincetown with rod and reel. The general public have no conception of the enormous quantities of pollock which have been either marketed fresh in Boston or landed at Gloucester for salt curing. Upwards of 60 sail were occupied during the months of September, October, November and December, each vessel making two or three trips a week.

It is reported that the cook on one of these crafts "made $500 since the latter part of September." Another report has it that the "crew of another vessel have averaged $35 each per week since we started in the latter part of September, and have been home two or three times a week;" and "that ain't so bad."

Whiting. — There are decided evidences that this fish is gaining ground in the market.

Inspection of Fish. — There have been no requests during the past year for the inspection of fish, under chapter 138, Acts of 1902, and no fees have been received.

Dogfish. — An extended report upon the damage done to our fisheries by dogfish is to be found on pp. 95–169.

Seaweeds. — Large possibilities in the development of vegetable sea foods exist on the Massachusetts coast. At present attention is given to but two species, Irish moss (*Chondra crispus*) and dulse.

The methods of securing Irish moss are destructive to such an extent that some of the rocks are almost completely denuded. The Irish moss fisheries at Scituate are capable of great improvement. The season for gathering extends from May to September. If the gathering should be regulated with reference to the spawning season of the plant, the supply might be increased, and the fishermen thus be able to secure a larger quantity per day. The crop of 1903 was valued at $31,050.

Dulse is considerably prized by our foreign-born citizens from the south shores of Europe, and is generally on sale in the fruit stores.

Dr. H. M. Smith of the United States Bureau of Fisheries,

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who has studied the seaweed industries of Japan, has called attention to the fact that species similar to those utilized in Japan to the extent of $2,000,000 worth annually are abundantly growing wild and neglected in the shallow waters of our bays. Under Japanese methods certain species of these plants make delicious salads, other species yield valuable jellies, while others are useful as condiments. An experimental study, to develop methods for utilizing this source of wealth, should be instituted in Massachusetts, where, from Dr. Smith's observations, the possibilities are at least equal and perhaps superior to those in Japan.

The Powder Hole Reservation. — In accordance with Resolves of 1905, chapter 54, the commissioners took "full control of the Powder Hole, so called, at Monomoy Point in the town of Chatham." The description and statement was duly filed Nov. 27, 1905, and recorded in the registry of deeds at Barnstable.

Previous to this taking, we made observations and experiments which appeared to indicate the great value of this special locality, on account of its adaptability for the study of the natural history of the lobster, clam, quahaug, scallop, oyster and winkle, all of great economic value to the people of this Commonwealth, either directly as food or as bait for the sea and shore fisheries of this region.

Capt. George W. Bloomer of Chatham was placed in responsible charge of this Powder Hole reservation; and with the active interest and co-operation of the other fishermen and residents we hope for large results, which will benefit not alone the residents of that section of Cape Cod, but through them the general public.

The definite purpose of the work there is to devise a commercially practicable method of rearing lobsters to a marketable size. Fortunately, also, favorable opportunity appears here to study the habits and life history of the scallop, with a view to the possible rehabilitation of this declining industry, which in past years has brought large amounts of money to the towns on the South Shore of Cape Cod.

The clam flats are well adapted for the growth of both the long clam (*Mya arenaria*) and in places also the sea clam

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(*Mactra solidissima*), and thus offer special opportunities to study both these animals and their enemies. The quahaug or "little neck" (*Venus mercenaria*) can also be reared. Thus the natural conditions are unusually propitious for the study of methods for increasing the annual yield of these animals. As the advantages and importance of the work become known to the people of those localities, the heartiest sympathy and co-operation will develop.

During the spring and summer of 1905, 267 egg-bearing lobsters were placed in the Powder Hole. More than 4,000,000 young lobsters were hatched from their eggs. During the hatching period we found in the immediate neighborhood of the hatchery that the water was swarming with just-hatched lobsters, at the rate of 6 to each cubic foot of water. The lobsters were rapidly scattered by currents, so that cannibalism was prevented. Between July and November, 1905, 642 green egg lobsters and 98 male lobsters were put in. These were supplied with food. It is expected that these lobsters will safely pass the winter here in the 20 feet of water. Should this prove to be the fact, we shall turn attention to some method of controlling the ravages of such fish as we find preying upon the young lobsters; and, with the control of the enemies of the lobsterlings, a practical commercial method of rearing young lobsters may be possible.

The Lobster Fishery. — A discussion of the decline of the lobster industry, its causes, and a probable remedy based upon biological experience, is given at length on pp. 171–214.

The Shellfish Industries. — Almost the entire Massachusetts coast formerly had extensive and very valuable mollusk fisheries. Our location is fortunate, since zoölogically our coast is the point where the habitats of the northern clam (the soft clam, *Mya arenaria*) and of the southern clam (the quahaug, hard clam or little neck, *Venus mercenaria*) overlap. On our coasts the area between tide marks was formerly inhabited by huge quantities of soft clams, and the muddy patches just below low-water mark produced great numbers of quahaugs. In the estuaries of our rivers and creeks were extensive native oyster beds. On our shoals it was possible to gather hundreds of thousands of bushels of scallops. To-day all is changed. In

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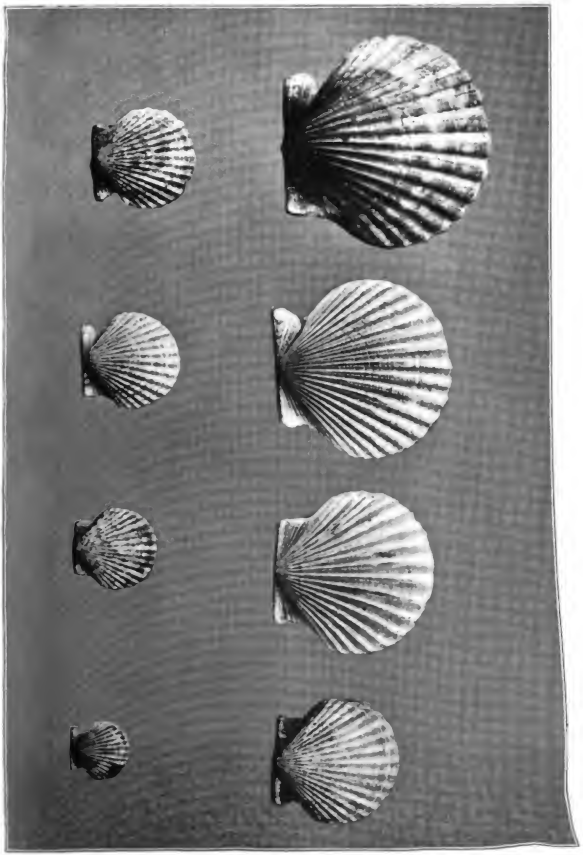
a few places it is still possible to get a relatively few clams and quahaugs. The scanty yield of scallops will not exceed 30,000 gallons. The natural oyster beds have all but disappeared, either "fished out" or buried under the débris of civilization. The total yield of the shellfisheries is valued at close to $500,000 annually. Yet the areas can again be made to produce the normal yield. The value of the annual catch should be increased tenfold, and incidentally furnish increased opportunities for labor, for coopers, tinsmiths and other artisans, for transportation companies, and so on all along the line. Again, like the Pilgrims at Plymouth, we may "suck the abundance of the seas" and find health and wealth.

The opportunities for development are alluring. The conditions parallel those of agriculture, except that in case of marine farming the crops are more certain, *i.e.*, are not subject to so many fatalities. The money value of the crop per acre is only equalled by the results of the most intensive farming. Net profits of $500 to $1,000 per acre are frequent. The capital required is small. The skill required to guide and to assist nature is slight. The labor is practically limited to the harvest.

That we are not to-day securing the maximum yield of the areas suitable for growing shellfish is due to the increased demand, which has led to unsystematic digging of clams and the destruction of seed scallops. Pollution of the flats has led to destruction of much spat which is smothered in the slimy sludge of sewage. The *present laws* have placed the mollusk fisheries completely in the hands of the Philistines of town government. Petty local jealousies, unsystematic tenure and uncertainty as to private and public rights have prevented the development of private enterprise. By the system of town control we have escaped neither the dangers of monopoly nor of continued depletion of the supply, while the facts concerning the public ownership of the shellfisheries are in danger of becoming obscured.

During the past summer the commissioners have begun a series of experiments to determine the most practical methods of increasing the yield of shellfish under different conditions of tides and currents, soils, etc., and also facts in the life history of the edible mollusks, in order that by complete knowl-

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Scallops taken in one dredging at Nantucket, Nov. 7, 1905, showing variation in size.

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edge we may better take advantage of natural processes. Massachusetts, by natural conditions of its coast, its markets as great centers of food distribution, and its large number of summer residents, is peculiarly fortunate. Practically limitless quantities of shellfish can be profitably handled.

During the past season the work has been laid out for the next two years. The following statements are but preliminary to the complete report.

The work upon the food mollusks has been carried on under the general direction of the chairman, and immediately in charge of Prof. James L. Kellogg of Williams College, perhaps the best authority on this continent upon the clam and oyster. The work has been carried on, with great credit to himself and to the satisfaction of all, by the biologist to the commission, D. L. Belding, A.B., assisted by Mr. R. L. Buffum and others. Mr. Belding's report follows: —

Dr. George W. Field, *Chairman, Commission on Fisheries and Game.*

Dear Sir: — I herewith submit my report for the year 1905, as follows: —

Since I began work as biologist for the commission, June 26, I have devoted my time, with the exception of two weeks, entirely to the investigation of the shellfish of Massachusetts. These two weeks were spent in examining the conditions of certain fresh-water ponds, in response to petitions requesting the commission to stock them.

The necessity of improving our shellfisheries has become at the present day a matter of great moment. This has been brought about chiefly by the increasing scarcity of our once abundant supply.

For the first time in its history the Commission on Fisheries and Game has received appropriations for the investigation of edible shellfish. For some reason the shellfisheries have been totally neglected from a scientific point of view, and very little investigation has previously been conducted. This is especially true of the clam, quahaug, and scallop. As the oyster has received a fair share of attention, my work this summer has been confined chiefly to the three former.

The experiments undertaken are for the most part of a preliminary nature, and especially devoted to the biological investigation of the life history and growth of these shellfish, as only from a thorough and complete knowledge of the life of these bivalves can results tending towards the improvement of the shellfisheries be obtained.

A handicap to the work, which became more apparent as the summer progressed, was the lack of a laboratory. At least a temporary laboratory is essential to a systematic observation of many details in the life history of these shellfish.

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Clams.

It is hard to realize that the flats of this Commonwealth, once so thickly set with the soft-shelled clam (*Mya arenaria*), are rapidly becoming barren; but statistics in our clam fisheries show a decided decrease in production. There can be no doubt that wasteful exploiting by man has been the chief cause of the destruction of our clam flats. The clam flats of Essex furnish an example of this. Large portions of these, once bearing immense numbers of clams, now lie unproductive, and yet the conditions appear just as favorable for the growth of clams as in former days. The result of this decrease has thrown many hundred clammers out of business and now our future clam supply, both as food and bait, is seriously threatened.

The plan of the clam experiments conducted by the commission the past year is based upon three main objects: —

1. In the first place, experiments have been made to determine the rate of growth of the clam. Two important questions are considered under this head: (*a*) How soon can a marketable clam be produced? (*b*) What are the causes influencing the rate of growth, and the conditions that cause this rate to vary?

2. The second object of these experiments is a commercial one, including all parts which relate to the practical side of clam culture. Artificial clam beds have been planted, both on productive and barren flats, the size of the beds being based on an acre as the standard. The amount of small clams planted was measured in terms of quarts, and the yield estimated by the same standard. The chief object of this side of the work is to conclusively demonstrate that methods of successful clam culture are easier than oyster culture, and that by assisting nature the yield of the clam flats can be greatly increased and that profitable clam farming can be conducted. In following out this line the average and the maximum production per acre under different conditions are being determined by experiments.

3. The third object of these experiments is to ascertain the actual yield of the clam flats of Massachusetts. The reasons for scattering our experiments along the coast are: (*a*) the average yield of the whole coast could thus be determined; (*b*) a comparison of the rate of clam growth in different sections of the coast could be made; (*c*) all localities which produced clams could share alike, as it was not desired to confine all our experiments to any one town in particular, to the neglect of others.

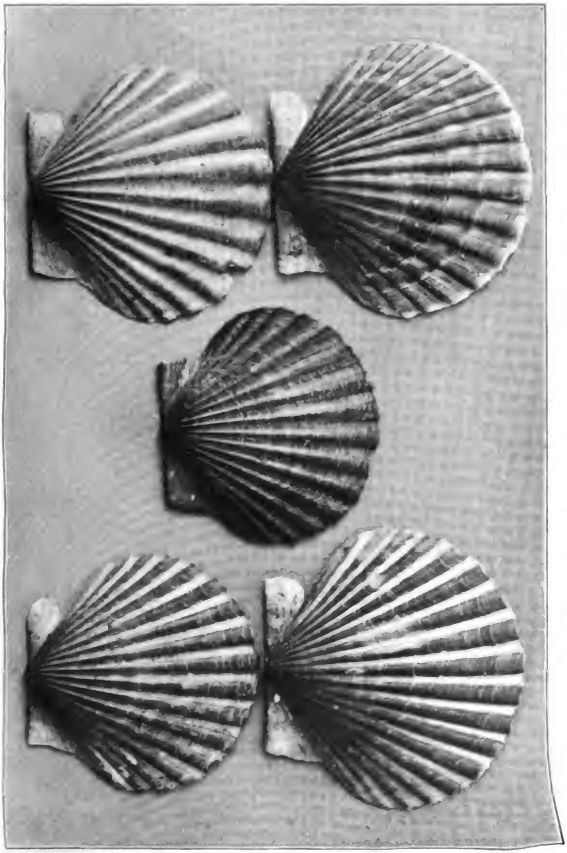
Method of Work.

I. *Protection of Beds.* — To insure the success of the experiments, it was found necessary to have some means of protection from the encroachment of clammers. Although it was almost impossible to keep careful guard of all the beds, as they were scattered along the coast, the following methods were used, with fairly favorable results: —

1. Printed notices were posted on the beds.

2. The experimental beds wherever possible were situated under the direct observation of certain gentlemen interested in their success.

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Scallops showing two or three lines which indicate temporarily arrested growth

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3. In a few cases the method of covering the surface with wire netting, securely fastened in the sand with long wire staples, was used. This did not interfere in the least with the growth of the clams, and made digging impossible, furnishing absolute proof whether or not the bed had been disturbed.

II. *Location of Experiments.* — Artificial beds have been planted at Dartmouth (Slocum's River), Onset, Monument Beach, Woods Hole, Harwichport, Nantucket, Chatham, Monomoy Point, Provincetown, Gloucester, Essex and Wheeler's Point (Annisquam River). Sixty experimental beds have been prepared, and are under observation.

III. *Size of Clam Beds.* — Two sizes of beds have been planted: (1) $\frac{1}{100}$ of an acre, or 435 square feet; (2) $\frac{1}{1000}$ of an acre, or 43½ square feet. The reason for these sizes was to keep all records in terms of an acre for the practical side of the experiment, and also because these were the most convenient sizes for computations.

The method used to fix the location of these beds consisted of a double set of posts, one set sunk level with the surface, the other 4 to 5 feet high. The ranges of the bed were then taken. The precaution of a double set of posts was made in case the ice took away the high posts, for the sunken posts could be located by the ranges, and thereby the boundaries of the bed found.

IV. *Seed Clams.* — The clams planted varied in size from an inch to an inch and a quarter. Measurements of these were made as follows: (1) length of shell; (2) average number per quart; (3) number of quarts planted; (4) a table of volumetric displacement of different sized clams was made. In making this, large quantities have to be considered because of the error caused by the residual water in the clam. The clams for planting were usually obtained near the bed, although in a few cases they had to be brought from distant points. Careful account of the amount of seed clams and of the time required to obtain these has been kept; also, how they were kept, and their condition when planted.

V. *Clearing the Bed.* — The most tedious part of the work was taking from the bed, before planting, the clams which were naturally there. The necessity for this is obvious. (1) It is important to know exactly what was planted in the bed. (2) An accurate record of the natural yield of the beds is desired.

VI. *Methods of Planting.* — Several methods of planting were tried. The best way for the experimental beds was the individual planting of each clam. The method consisted of making a hole either with a pointed stick or finger, and dropping in this the clam, siphon end up. Clams can be thus kept at the right distance from each other. Lines were marked out either by string stretched across the bed, after the manner of garden planting, or by grooves made with a marker.

The practical method for large beds is merely sowing the clams and spreading them evenly over the surface. It has been found that a small clam can burrow into the sand faster than a large one. An inch clam is a very rapid burrower, and therefore is an excellent size to sow. The only trouble with this method of planting when applied to small experimental beds is that the tide bunches the clams together, causing them to go into the sand in clusters. This can be helped somewhat by turning

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over the surface of the ground. Dr. Mead of the Rhode Island Fish Commission found that a greater per cent. would burrow when the ground was dug over than when left undisturbed. A method used some years ago in Essex consisted in breaking the surface with long-toothed rakes before sowing.

A third method of planting, used for exact work, was obtained by constructing a light framework of laths, containing exactly $\frac{1}{1000}$ of an acre, and divided into square feet by heavy cord. At the time of planting, this frame was placed upon the bed, the corners fitting upon the sunken posts. Clams were planted with different arrangements per square foot, both in numbers and size, and a record kept of this. When the clams are removed, the same frame is replaced, and the exact position of each square foot of clams can be obtained.

VII. *Wire Baskets.* — In determining the maximum production per acre an important question was, how many clams to the square foot could exist, and what arrangement of those would afford the best growth and simplest method of digging.

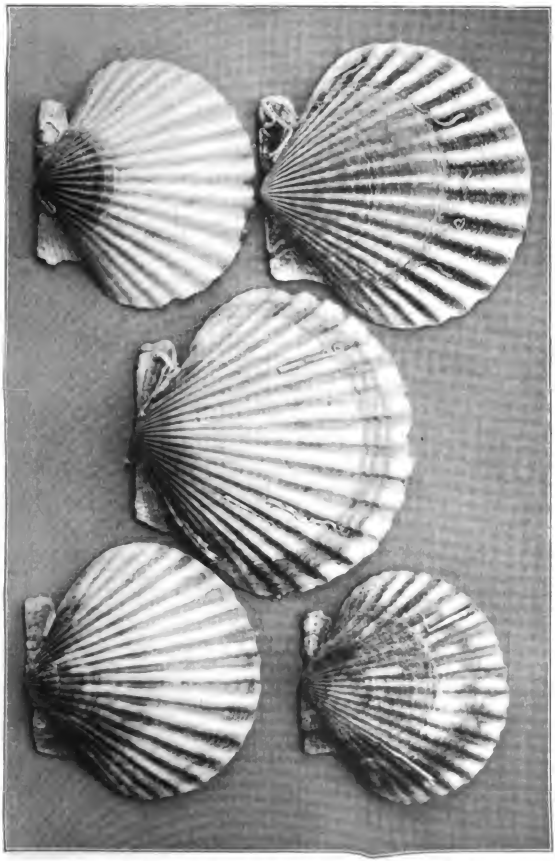
Wire netting (one-inch mesh) was buried perpendicularly in the sand in the form of squares, each containing one square foot of surface. This seemed an advantage over tiles, as the open mesh was a nearer approach to natural conditions. A number of these squares were placed in the beds, and different numbers and arrangement of clams of the same size planted. In many cases the clams were notched with a file, — a sure way of indicating an increase in growth.

The conditions which govern the growth of the clam, although in appearance simple, are nevertheless very complex. The conditions in one locality may be entirely different from those in another, so it is hard to set down any rigid set of rules concerning the growth of the clam. During the past year experiments have been made to illustrate the following conditions and their effect upon the growth of clams: (1) Comparison of growth in rapid and slow currents; (2) the food of the clam, and its influence upon growth; (3) growth in crowded and thinly planted beds; (4) growth under low water and under various lengths of tide; (5) relation of density of water to food and growth of clam; (6) effect of chemical nature and condition of soil; (7) comparison of growth of different sizes of clams under same conditions; (8) enemies, such as starfish, *Lunatia* (commonly known as "winkle"), etc.

A part of the work undertaken this summer was the planting of artificial beds on barren flats. Flats were chosen where the conditions appeared favorable to the growth of clams, but which were then barren, and had been thus for many years. Most of these experiments were conducted at Essex, and many of these flats had once been productive. An especially interesting and important side of the work is to prove that hundreds of acres of our clam flats now unproductive can be reclaimed and made profitable. The methods followed were similar to those used in the other experiments.

Hardly anything is known about the conditions determining the set of young clams. The egg of *Mya* unites with the male cell in the water. After fertilization a ciliated embryo is produced, which swims in the water for a week or more. During this time it is under the con-

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Scallops showing variation in size of growth line, indicating the impossibility of thus defining "seed" scallops.

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trol of the tides and currents, with the result that it often is carried great distances. When the right conditions are present it sets both below low water and between the tide lines, although in most cases the clam does not strike good ground, and soon dies. Often the set is extremely irregular; one place will have a very heavy set, while another will have none; one locality may have a heavy set one year and not any the next, thus proving that the success of a set is determined by a combination of favorable conditions.

The sets of young are often very heavy. Observations are now being taken of a very heavy set in Annisquam River, where in many parts the clams are as thick as 600 to 1 square foot of surface. These clams average one inch in length, and are forcing each other out of the ground by their growth.

A set may appear any time in the summer, and even in the fall, the set in Annisquam being as late as August 20.

A biological survey of the Massachusetts clam flats is now under way, with the following objects in view: (1) probable area of clam-producing flats; (2) the area of barren flats capable of producing clams under proper cultivation; (3) those flats which can be cultivated at slight expense, and those at greater expense; (4) biological conditions of these flats.

Experiments for next year will be conducted along the following lines, in addition to those already begun: (1) Experiments with different designs of spat collectors will be made in order to determine the most satisfactory means of successful spat collecting for commercial purposes. (2) Accurate and systematic observations of the spawning season will be conducted, with the following points in view: (*a*) length of season; (*b*) conditions influencing this; (*c*) size and age of a clam when it spawns; (*d*) which furnishes the best spawn, old or young clams. (3) Study of early life history. (4) Enemies. (5) Further growth experiments on a commercial basis, and study of conditions influencing the growth of shellfish.

Scallops.

The common shallow-water scallop (*Pecten irradians*) inhabits the waters south of Boston. In the past this shellfish has been exceedingly abundant in the coast waters of Cape Cod and Buzzards Bay. For many years its value as a commercial commodity was unknown. The last two seasons have shown a rapid decline in the scallop fisheries, resulting this year in a great scarcity of scallops along the Massachusetts coast.

An important part of the summer's work was obtaining reliable information concerning the life and habits of the scallop, upon which a definition of the term "seed" scallop could be based.

The general law in regard to the capture of seed scallops (section 84, chapter 91, Revised Laws) reads as follows: —

> Whoever takes seed scallops from the flats or waters of the Commonwealth shall be punished by a fine of not less than twenty nor more than fifty dollars for each offence; but such penalty shall not be incurred by any person taking such scallops who returns them alive to the flats or waters from which they were taken.

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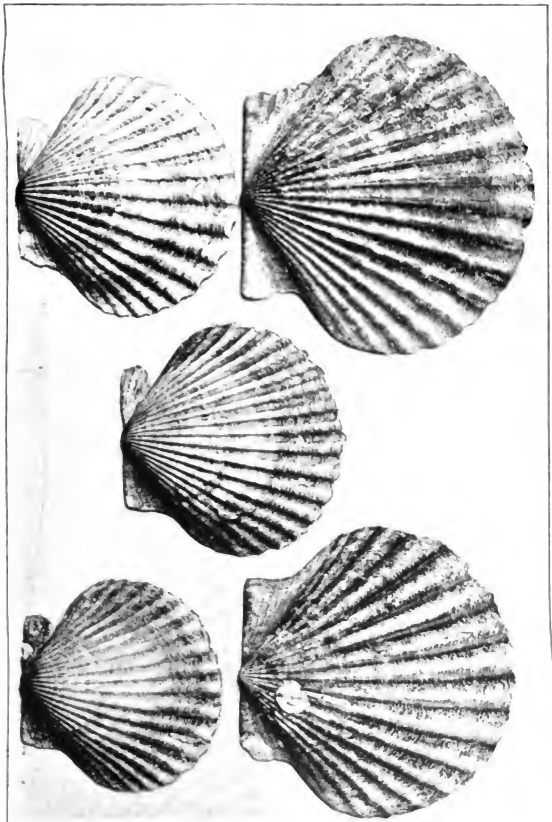
As this law now stands, it is useless, as no conviction can be tained when the term "seed" scallop is not defined. For this rea there is a distinct need of a corollary to the law, which will define term "seed" scallop.

The life of a scallop under natural conditions covers usually f twenty to twenty-two months, only a very few scallops ever passing two-year mark. Knowledge of this fact is important, when the spa ing season is considered. A scallop spawns when a year old, the spa ing season in Massachusetts lasting through June and July. As majority of scallops do not live more than twenty-two months, it i once apparent that the scallop spawns but *once* in its lifetime. Ap ing this to the term "seed" scallop, we come to the conclusion thi seed scallop must necessarily be less than one year old; that is, a sca which has never spawned. Therefore a seed scallop will be defined designating it as a scallop of the last summer's set.

Considering the fact that in general a scallop spawns only once is immediately apparent that any wholesale capture of seed is pe iarly a menace to the future of the scallop industry. The sca entering upon its second winter can be taken without injury to scallop fishing, as it has spawned the previous summer, and the majo are destined to die during the approaching winter, either at the h of nature or of man. Although each seed scallop is capable of p ducing at least 100,000 eggs, relatively very few of these eggs re maturity, and only by overcoming adverse natural conditions. In way any destruction by man soon makes itself felt. This year show scarcity in the scallop market, and it cannot be denied that man as as the last severe winters has been a potent factor in this scarcity. surprising feature is that the fishermen who take seed scallops do seem to realize that they are injuring their own interests, but put f the excuse that the winter would kill the scallops if they did not t them. By waiting another year the fishermen could reap these adv tages: (1) larger scallops, (2) better prices, (3) less labor, (4) above all, insure the future of a profitable industry.

To a person unacquainted with the rapid growth of young scal it may seem incredible that scallops spawned early this summer large enough for market. The chief amount of growth occurs in summer, and a scallop will be little larger next spring than late fall. Although there are scallops of all sizes, owing to conditions growth and differences in time of spawning, the majority of yo scallops are of a size profitable to capture. With an increas demand in the market, a greater quantity of seed is taken, as when prices are high does the capture of seed scallops become pr able. In this way a relation is established between scarcity in scallop supply and the capture of seed. Wherever large scallops abundant, it does not pay to bother with the seed; but where t are no large scallops, the seed will be captured, as is shown Chatham, where seed scallops were the only kind taken this sea

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The three smaller specimens (left) are adult scallops, from Edgartown. The two larger (right) are "seed" scallops, i.e., less than one year old, from Hyannis.

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Statistical Work.

Per Cent. of Seed Scallops taken. — The method of work consisted in visiting shell heaps at various scalloping centres, and determining by count the per cent. of seed taken. This work was carried out early in the summer and in the fall at the height of the scalloping season, when the catch could be observed.

As a rule, the percentage is not high. The lowest per cent. taken was found at Nantucket, 1.1. In 1904 on Cape Cod the per cent. was as high as 8.3. As has been said before, the entire scallop catch the season of 1905 at Chatham and Dennis consists of seed scallops. Ninety-eight per cent. of this catch are seed, as practically no other scallops can be obtained. Up to Jan. 7, 1906, the total shipment from South and West Chatham amounted to 1,165 gallons. Twenty men are engaged in the capture of seed scallops, but some of these do not make it a steady business. A man can obtain from 2 to 5 bushels every day he scallops. At Dennis the capture of seed scallops is more recent, as the scalloping only "struck in" after January 1. Six men make it a business, and an average catch for each is from 3 to 4 bushels. Such wholesale destruction of seed scallops does far more damage than ice or any other natural causes in producing the alarmingly progressive depletion of our scallop industry.

From these figures it can be seen that a large amount of seed is being taken, and I again advise that action be taken legally to put an end to such practices.

It is possible for the fishermen to separate nearly all the seed from the other scallops in culling, as they can recognize at a glance the seed scallops. There is a newness about the shell, a color which sharply differentiates it from the old scallop. The seed scallop is usually smaller and thinner, the shell is free from serpula, crepidula, etc., and it does not have the worn appearance of the old scallop. It has no well-marked growth line, but this is not an infallible test. It is impracticable to use the growth line in defining the term "seed" scallop. There is a halt in the growth of a scallop just before the spawning season, and when the new growth begins a line called the growth line is formed. In some scallops this is very prominent; in others faint. The trouble in using this to differentiate a seed scallop is that there are other causes which stop the growth and form similar lines. As in many cases these lines are on the small scallops, it is therefore impossible to make any classification on this basis.

Growth Experiments.

Monomoy Experiment. — July 10, 1905, a wire pen was constructed in the Powder Hole at Monomoy Point. The water in the pen at low tide was 1½ feet deep. The pen was situated to receive full benefit of the tide, and thereby a good food supply. In the larger divisions of the pen 150 scallops were liberated. These were obtained from Dennis on Cape Cod after much difficulty in finding any for this purpose. Two weeks were spent in dredging along the south shore of

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Cape Cod, the result proving conclusively that there were scarcely any scallops along that coast. In the second division of the pen were placed scallops of considerably smaller size, which were obtained at Nantucket.

Three methods of measuring were used: (1) measuring with calipers the height, width, and thickness; (2) volume by water displacement, which gave the true increase in growth; (3) average number per quart.

Unfortunately, measurements could not be made often during the summer, and only three sets of measurements were taken. However, these show the comparatively rapid growth of these shellfish.

Division 1, Cape Scallops: In a period of eighty-seven days (July 10 to October 5) a gain of 20.58 per cent. was recorded; in sixty-three days (October 5 to December 7) a gain of 11.33+ per cent. was obtained.

Division 2, Nantucket scallops: In a period of forty-six days (August 20 to October 5) a gain of 23.316 per cent. was made; in sixty-three days (October 5 to December 7) a gain of 19.87 per cent.

These results show two important facts: (1) the smaller scallops (Nantucket) grew faster than the larger scallops; (2) the growth during the months of August and September was faster than that of October and November, showing the influence of cold weather.

Measurements were made at intervals during the summer, showing the growth of the scallops at Nantucket. The measurements were made with calipers.

Observations were made for a short time on the growth of the scallops of the set of 1905. Their growth is very rapid, and they often exceeded in size the small-sized old scallops.

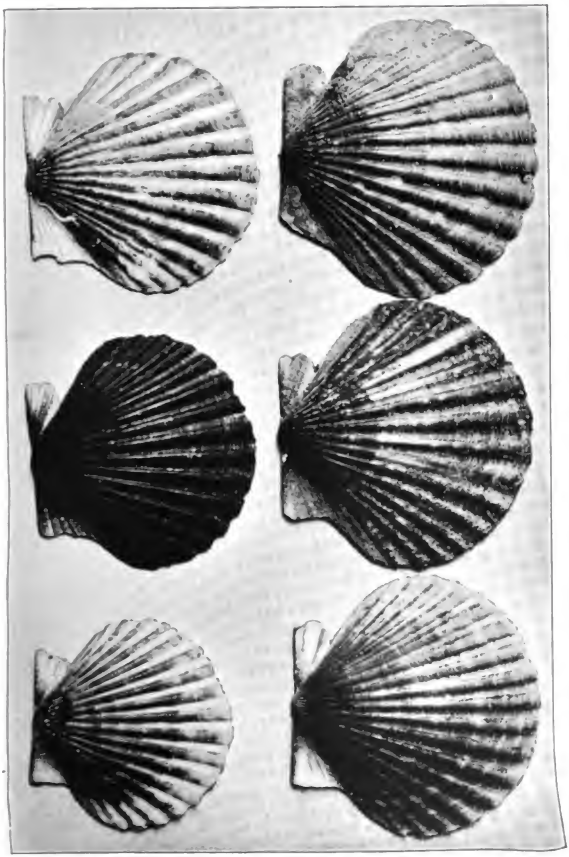
Very little is known concerning the early life of the scallop. It is first noticed when extremely small, attached to eel grass by a byssus thread, which it can cast off at will and immediately spin another. This is known as the attachment period, and lasts for an indefinite time, large scallops being sometimes attached. This usually ceases when the scallops are the size of a silver dollar, and they remain free. This period seems to afford them a rapid growth without any check until detached.

Measurements in volume of penned scallops show an increase of 31.67 per cent. in twenty-one days, the scallops when first examined measuring one and one-half inches in width.

There are great variations in the size of the young scallop. This is due either to difference in food supply, or time of spawning, or both. This calls our attention to the spawning season. The methods used in following the spawning of the scallops were by (1) examination of eggs with microscope; (2) recording the color of the egg sac, which is a bright orange when the scallop is ready to spawn. Owing to a late start, a complete examination of the first part of the season could not be made.

Two facts were observed concerning the spawning season. One was the variation in conditions that influence the spawning. Within two days two sets of scallops under different conditions were ob-

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Average size, on Dec. 1, 1905, of "seed" scallops taken at Chatham for market, *i.e.*, scallops hatched from eggs laid during the preceding summer.

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served. One set had nearly all spawned, while very few of the other had started. The chief difference was probably that of temperature, which is also shown when it was observed that the shallow-water scallop at Nantucket spawned earlier in the season than those in deeper water. The rule, the warmer the water the earlier the spawning season, seemed to hold true. The second fact noticed was the difference in the time of spawning of the Massachusetts scallops compared with the Rhode Island scallops, which spawned earlier. This is again probably due to temperature. The spawning season in Rhode Island lasts through June, while in Massachusetts it was observed to last through part of June, July and even till August 20, when it was found that 30 per cent. had not finished spawning.

Another part of the work was the investigation of the extent of the 1905 scallop fisheries. This season was marked by a great scarcity in scallops. The only places where any large amount of scallops is caught are Nantucket and Edgartown. A few scallops are caught at New Bedford, Cotuit, Hyannis and Chatham. This scarcity has been the cause of the recent high prices, scallops wholesaling as high as $3 to $5 a gallon. The severity of the winter of 1904–05 has, in my opinion, been the chief cause of the scarcity along Cape Cod.

An estimate of the yield of the scallop fisheries of Massachusetts gives 30,000 gallons as the yield for the three months of October, November and December. Two hundred and fifty men made a business of scalloping this year, although the exceptional run of codfish in Vineyard Sound has drawn away many scallopers. At a minimum estimate, 250 men at eighty days, 1½ gallons per day (probably a low estimate), equals 30,000 gallons during the season.

An excellent opportunity for work on the scallops next summer will be afforded by the presence of a large number of these shellfish in the Powder Hole at Monomoy Point. Investigations on the following points will be conducted: (1) The early life history will be studied, with the view of determining the conditions influencing the set, and any practical methods of increasing it. In carrying this out, artificial fertilization will be attempted. (2) Study of the attachment period, and its influence on the life of the scallop. (3) Further investigation of the spawning season. (4) Migration of scallops, and causes. (5) Enemies. (6) Transplanting to waters north of Boston. (7) Further growth experiments in relation to scallop culture.

Quahaugs.

Although widely known as an article of food, the quahaug is the least known of any shellfish from a scientific standpoint. Nothing is known on such important points as: (1) early life history; (2) spawning season, length of spawning season, age and size of quahaug when it first spawns; (3) rate of growth and conditions influencing this. The importance of such knowledge of the life and habits of this shellfish can hardly be estimated. Only from this knowledge can satisfactory laws and regulations controlling the quahaug industry be made, and methods of perpetuating our quahaug supply be devised.

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The quahaug, or hard-shelled clam (*Venus mercenaria*), is found usually below the low-water line, though occasionally it wanders between the tide lines. The different conditions under which the quahaug lives required modifications of the methods used in clam experiments, and in many cases they were entirely different. The experiments were conducted on a smaller scale than the clam experiments, and necessarily were of a more preliminary nature, as this was an entirely new field.

In obtaining the rate of growth, the work was handicapped by our inability to find quahaugs of sufficiently small size to get the whole rate of growth. Fortunately, a place was discovered, August 20, at Nantucket, where quahaugs of extremely small size could be obtained. Work was at once begun, and beds located at Nantucket, Monument Beach, and Monomoy Point. In the first two the beds were located in oyster grants, for protection. The main part of the experiments has been carried on at Monomoy Point.

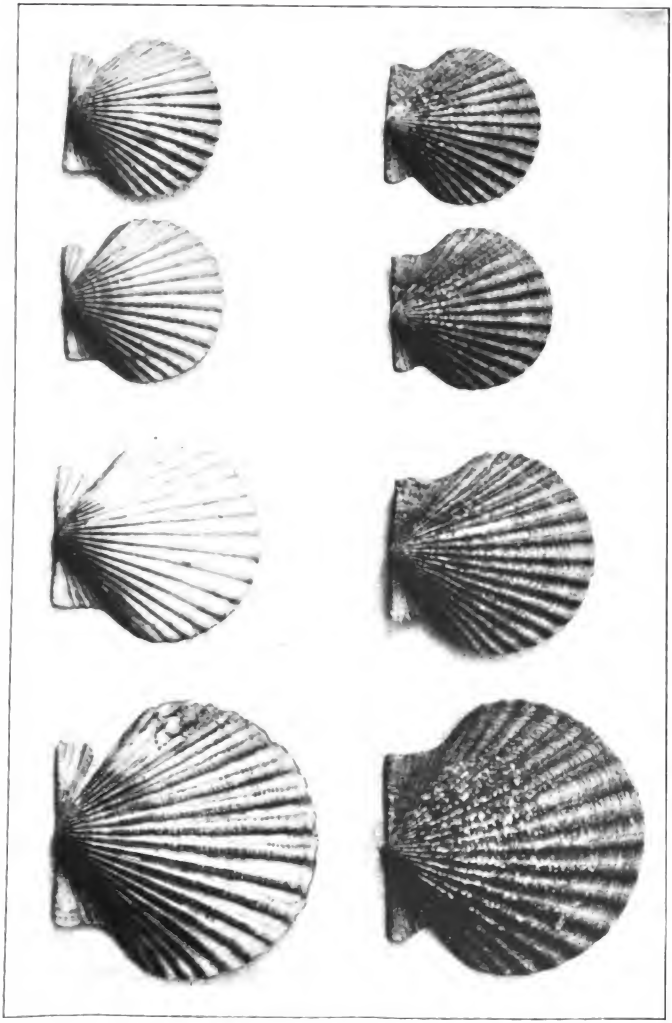
It was found that beds could most easily be made by sinking clapboards in the mud or sand, level with the surface. The quahaug in its wandering cannot get over this, and is thus penned in. It was found impossible to satisfactorily sink larger boards, owing to their buoyancy in the water.

Quahaugs of all sizes, from one-fifth of an inch to two inches, were planted. These were all carefully measured and placed in compartments according to size. The methods used in determining the rate of growth were measuring with calipers and determination of volume by displacement in water. The true increase in growth can be determined in this way without the slightest error, as the shell shuts closely. The growth of a quahaug from one inch to two inches is not merely a gain of 100 per cent. but of 550 per cent., when the volume is considered. A table showing the displacement of the quahaugs of various sizes has been made. Another method to show the increase in growth was by notching the edge of the quahaug shell with a file, enabling one to distinguish the old from the new growth.

The rate of growth is being observed under various conditions, such as: (1) on a bottom where eel grass is plentiful; (2) on a free bottom, both mud and sand; (3) in rapid and slow currents; (4) between the tide lines; (5) in a wire rack, in rapid current; (6) at various depths of water (box experiments). A comparison of the results obtained from these experiments should show the best natural conditions for rapid growth. The maximum production per acre is being determined by a method similar to that used with the clam.

The following experiments will be undertaken next summer: (1) Artificial fertilization, and a detailed study of the early life history of the quahaug before it sets. (2) A method of spat collecting which will be of practical benefit to the quahaug industry. (3) Observations on the spawning season, considering the following points: (*a*) length of season; (*b*) age of quahaug when it first spawns; (*c*) which furnishes the best spawn, an old or a young quahaug. (4) Continuation of growth experiments. (5) Continuation of commercial experiments in regard to the maximum production per acre under various conditions. (6) Food and its relation to growth of quahaug. (7) A knowledge of its life, habits, enemies, etc., which should prove of value to the quahaug industry of Massachusetts.

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Living scallops, taken from crop of eider duck
by J. H. Hardy, Jr. Chatham, 1906.

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Oysters.

In the first part of the report I gave reasons why I paid special attention to the other shellfish in starting my work. A biological survey of the oyster beds of our coast has been begun this summer. Experiments in oyster culture will soon be put under way, and conducted along the same lines as the other shellfish experiments. Naturally these will be of a more specialized and advanced nature, as the life and habits of the oyster have been more carefully studied than those of the other shellfish.

Conclusion.

During my summer's work, two things, which I should like to bring before the commissioners, have come to my attention.

The first is in regard to the length of the scallop season. The present season allows scallops to be taken from October 1 until April 1. I should like to present the question of changing the opening of the season from October 1 to November 1. My reasons for this are twofold. First, the scallop grows considerably during the month of October, and it would be an advantage to have a larger and better scallop. My second reason is perhaps stronger, as it concerns the fishermen directly. The fact that men who scallop are forced to give up their other fishing and begin scalloping at once, so that they may get their share of perhaps a more lucrative industry, is a disadvantage to our fisheries, as these men could have made a living the month of October at other fishing. I have spoken with many fishermen, and they favor a later season, for that reason. Without doubt this change would be in favor with a large number of fishermen, owing to the present scarcity of scallops and the exceptional codfishing in Vineyard Sound. There are two obstacles. One is, the men who do no other fishing than scalloping; the other is one that does not appear probable, namely, a large amount of scallops, which would not give time to capture all if the winter were severe.

Secondly, I should like to call attention to the disadvantages caused by town control of our shellfisheries. One town may make a law to oppose another town, and will often injure its own interests thereby. In this connection the condition at Dennis, during the winter of 1904–05, was an instance. As scallops were remarkably abundant, the town made by-laws intended to exclude from its scallop fisheries the residents of other towns. At the close of the scalloping season the scallops were still abundant. This year they believed they would get the rest. Not a single scallop of that set was to be found; they had died. If other scallopers had been allowed to go there, thousands of dollars could have been saved, and many scallopers given employment. This is only one case out of many which show the disadvantage of town laws.

I merely mention these two facts, which have impressed me this summer, and hope that a thorough investigation of each can be made.

Respectfully submitted,

David L. Belding,
Biologist.

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Inland Fisheries.

The past year has been a rather unsatisfactory one, particularly in the western half of the State. A prominent cause was the abnormally deficient autumnal rains. This led to unusually low water in the brooks. The extremely cold winter in many instances froze brooks solid, and thus killed many small fish.

In the western part of the State, as a result of the close fishing of the brooks by those who aim for "record catches," the fish have been kept "caught up" to the 5-inch limit. There is, therefore, as was to be expected, a smaller number of 7 to 9 inch trout. With a few seasons of a 6-inch law, properly respected, more fish 6 inches and over will be found. Continual improvement is to be expected in the fisheries of our public streams and lakes, through the increasing development of a finer public sentiment regarding the fish and game as public property, which should be protected against unlawful depredation and wisely maintained for the benefit of the entire public.

Although 1,861,443 fry and fingerlings of all species have been distributed to public waters during the past year, that number is far insufficient for properly stocking the streams. The entire product of the Adams, Hadley and Sutton hatcheries should be distributed in the western portion of the State. To meet the demands from all sections, the lots of fry and fingerlings are necessarily so small that satisfactory results can rarely be attained. The introduction of such small quantities of fish as those to which we are now constrained is too often futile and unnecessarily expensive. The expense of rearing and transporting a sufficient quantity of fry or fingerlings to produce results would require relatively little additional expense. Our hatching and particularly rearing facilities are notoriously insufficient to meet properly the demand made upon them. A hatchery with rearing facilities sufficient for an annual output of at least 250,000 fingerlings should be established.

The practice of artificially maintaining the supply of fish in public waters is operative in well nigh all of the United States and Canadian Provinces, as well as in Great Britain and the continent. It has proved to be a thoroughly practical

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proceeding, both on economic and recreative grounds. Reports are frequently received of improved conditions in Massachusetts as the result of stocking; yet, from the number of anglers who during the fishing season seek the brooks and lakes for recreation and for food, it is remarkable that the annual catch does not more appreciably decline.

Change of Regulation of Fishing in Stocked Ponds. — This department has instituted certain changes in the regulations placed upon fishing in stocked ponds, which it is hoped may prove satisfactory. Fishing in State ponds hereafter stocked will be open on every week day from June 1 to November 1, instead of Mondays, Wednesdays and Saturdays. Sunday remains a day when fishing is prohibited by the Sunday laws of the Commonwealth. Since it was decided by the late Attorney-General Knowlton that it was not within the province of this department to enforce the Sunday fishing law, the responsibility for the satisfactory enforcement of this law falls upon the local police and constables, unless the pond has been stocked and closed by this department. In this case arrests will be made by our deputies for fishing in closed waters.

Pollution. — The law against pollution of State waters by sawdust has been enforced vigorously, wherever in the opinion of the commissioners the fisheries were sufficiently valuable to warrant. In these cases we have used our best endeavors to protect the fishery rights of the people of the State, without placing undue hardship upon sawmill owners. Whenever we found that any considerable inconvenience or financial burden was likely to be caused, we have conferred with the sawmill owners. If a disposition to comply with the law was evident, we have given a definite period during which the necessary changes might be made. Prosecutions have been made only in case of wilful and persistent violation. During the year legal orders against allowing sawdust to enter streams have been served upon 17 mill owners. Fourteen different cases where owners had continued to violate the orders served in 1903 and 1904 have been called to court. All have been convicted. One was convicted twice, making a total of 15 convictions.

The people should see to it that the pollution of streams by sewage, acids and gas works and factory wastes should not be allowed to increase. The problem of the proper disposal of

waste products should be considered previous to the location of manufacturing plants. The streams of our State should be protected by law, both upon sanitary and economic grounds, from pollution by sewage, factory, mill or distillery wastes, etc., refuse from gas works, crude petroleum or oily hydrocarbons, etc. Such laws are in force in some of our States and in Europe. Much of the material which now enters the water could be utilized to advantage at slightly greater expense if dumped upon waste or cultivated land, after the English and German practices. Such a law would be a benefit to the fisheries, to agriculture and to the people, both for sanitary and for æsthetic reasons.

Game Fish. — From the State hatcheries 1,799,000 fry and 62,375 fingerlings have been distributed to the ponds and streams of the State. Twenty millions of landlocked smelt eggs have been placed in ponds which have been or were about to be stocked with brown and rainbow trout and landlocked salmon.

The Bureau of Fisheries has furnished to this department 100,000 brook trout eggs, 20,000 landlocked salmon eggs and 5,000,000 pike perch eggs.

Through the Bureau of Fisheries we have introduced the large-mouth black bass into Billington Sea, King's Pond and West Pond in Plymouth.

Carp. — We do not recommend the distribution of carp, and only furnish them for special purposes, such as clearing out excessive vegetation in isolated ponds, and then only when the pond is so situated that the fish are not likely to extend into other waters. There seems to be no question but that the carp may multiply to such an extent as to limit the supply of more desirable fish. Probably it destroys many eggs of the better class of fishes. Though the carp has special uses, in general we are inclined to limit our endorsement, and advise against the introduction of this fish directly or indirectly into public waters. "For those who want that kind of a fish, the carp is just the kind of fish they want;" but it is not wanted in the best waters of this State.

Shad. — The State did not get its quota of shad eggs from the Bureau of Fisheries, owing to the comparative failure of the hatch in the Susquehanna River.

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The shad question is worthy of special consideration. It is a fact that, if shad had not been artificially propagated by the United States Bureau of Fisheries, the shad fisheries on our entire Atlantic coasts would have long since been commercially extinct. Notwithstanding the success of the shad work, the facilities furnished by the national government are not sufficient to furnish to the several States a quota sufficient to satisfactorily stock and maintain the supply in their respective shad streams. Under these conditions it seems eminently proper that every State having possibilities for shad fisheries should take the necessary steps to hatch and distribute shad fry to stock its own public rivers, to the economic advantage of the public. Such a procedure would not be expensive, and, in our opinion, could be made commercially profitable, whether carried on by the State or by a business corporation controlling the fisheries of any shad stream under a special license from the State. For such a license a corporation could afford to pay a very tidy sum to the State treasury.

An article in the Boston "Transcript" says: —

Hartford, Conn., April 27. Fishermen along the Connecticut River and Sound shore are looking for a first-class shad season this year and for very good times in the future; for, if the hopes of the State Fish and Game Commissioners are realized, shad will fairly swarm in the river in the next few years.

The hatchery at Windsor will be started up again on May 1 under the charge of George Fletcher, a government expert, who will have two assistants. Last year about 500,000 fry were raised at Windsor and eventually turned loose. Enough more were obtained from the government to make the number put into the Connecticut about 4,500,000, while about 3,000,000 were released in the Housatonic River. Nobody knows where they are now, but in two years more they are expected to show up, — that is, a good proportion of them, — full-sized fish.

This year the commissioners hope that from 8,000,000 to 10,000,000 fry will be hatched out at Windsor. They will be put in the Joshuatown ponds and turned loose in the fall, with every expectation that they will be back again in three years. Besides these, it is hoped to obtain from the government two carloads of fry, which means about 3,000,000 each, one lot of which will be put in the Connecticut and the other in the Housatonic.

The Boston "Post" of April 20 says: —

Portland, Me., April 19. The shad fish situation in Portland has become a serious one, as but few fish are obtained, and what do reach

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the market are expensive. Cold and rough weather is believed to be responsible for this condition. Buck shad to-day were selling at 45 cents and roes at 80 cents. The usual prices are 15 cents for the former and 30 for the latter. The shad season is about half over.

From the "Lewiston Sentinel:" —

Shad are being caught in the Juniata River at Vandyke and other localities. Two generations ago shad were plentiful in the Juniata, but the Pennsylvania canal dams excluded these fish from the stream for more than half a century. Now that the dams have been breached, the shad have returned.

State Fish Hatcheries.

Report from the Sutton Hatchery.

Wilkinsonville, Mass., Dec. 10, 1905.

To the Commissioners on Fisheries and Game, State House, Boston, Mass.

Gentlemen: — The trout raised and distributed from this station this year were hatched from eggs collected here in 1904, amounting to 549,000, — 509,000 brook trout, 37,000 brown trout and 3,000 salmon. In March 20,000 more landlocked salmon were received from the United States Fisheries Bureau Station at Green Lake, Me., and in April 35,000 rainbow trout eggs were received from Hadley. At the same time 25,000 trout fry were received from Hadley, and later, in July, 15,000 rainbow trout fry.

The fish hatched late because of the low temperature of the hatchery water, caused by the severe weather of winter and the scanty supply of water, which was cooled more than usual in the long flow from the springs to the hatchery.

The condition of the fish was satisfactory. The fry distributed were in excellent condition; and those reserved for rearing developed unusually well when they began feeding, and grew to be a very satisfactory lot of fingerlings. The fish at all times were free from disease, and the only unusual losses resulted from the temporary arrangements for rearing, where the means did not permit of more secure construction.

There were 309,000 trout fry put out in the spring distribution, and 169,000 were reserved for rearing, resulting in 45,000 fingerlings. The rainbow trout, brown trout and salmon raised for stocking ponds numbered nearly 25,000, the number of each kind being nearly equal. All of these hatched much later than the brook trout, consequently they made less growth, though they were all of good size and quality.

Some very pointed lessons from the varying yield from different ponds were learned; but all observations continue to indicate the necessity of improving the ponds so that the fish will be thoroughly protected. Protection by watching for the destroyers of the fish is uncertain, expensive, and at times fails completely. One planked pen that seems secure from any enemy of the fish (except kingfishers, and

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these are easily killed) yielded nearly 12,000 fish, — an increase of 4,000 over the usual number; while several ponds that should have the same capacity yielded numbers varying from one-third to one-sixth of this. On one stream two connected ponds yielded 4,000 fish, though previously 17,000 had been taken from the same ponds in one year, and their capacity, judged by the yield of the planked pen mentioned, is even greater. We very greatly need a larger number of planked pens.

The loss of fish due to birds and other natural enemies was not checked, and it seems certain that in some ponds it was heavier than ever before, especially from the attacks of herons, the night heron in particular, although many ponds were covered and a close watch kept. The usual means taken to protect the fish seemed very ineffective, and it must be believed that the birds have acquired caution, as they avoided the traps which were set about the ponds in great numbers, and did not fly in until it was so dark that shooting was not practicable. The greatest damage is done during the period when the voracious young are being fed in the nest. The ponds where the most trouble is experienced are flowed or excavated basins, with shallow margins, remote from the buildings, and mostly of a size that has made covering impracticable with the means available. But it is evident that the ponds must be covered or otherwise protected if they are to be kept stocked to their full capacity. If covered, the structure should be permanent, so as not to require its erection each year after the fish are put in. In some cases, where sufficient depth of water could be secured, planking the sides would afford good protection. Many of the ponds, however, are so formed that the water could not be made deep enough. In many cases, too, the fish can be carried through the early part of summer better in shallow water, so for these ponds recourse must be had to covering. While the temporary coverings of fish netting now in use are good, permanent coverings of wire netting should be provided, so that the fish, after being placed in the pond, need not lack protection because of pressure of work at that season, when extra work cannot be undertaken.

In May an attempt to steal fish from the pond was stopped through the friendly co-operation of the Worcester police department, and the three men who made the attempt were arrested and convicted. Evidence was discovered that the thieves had been successful on previous visits. At the end of the season the brood fish were found to be about 300 short, although it is not supposed that all of these were stolen, for there is usually a considerable shrinkage from cannibalism, the larger brood fish often being seen devouring the two-year-olds put in to renew the stock. For several years the number missing has been about the same as this year, a part of the loss being laid to cannibalism and the rest supposed to be due to poachers. Adequate protection would probably cost much more than the value of the fish lost. The most serious loss comes from reducing the stock clearly below the capacity of the pond, and keeping the output much below what it should be; yet this is probably owing to a larger extent to the insufficient number of fingerlings reserved to keep up the stock. In 1903 none were re-

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served; consequently the brood stock contained no two-year-olds,—the best age for breeding purposes here. In 1904 the number retained was not sufficient to make up the deficiency, and the number reserved the present year does not promise to bring the breeding stock up to what it should be.

Although the improvements most desired could not be carried out, much was done to improve the station and its equipment. As far as possible the work was of a permanent character, temporary work being done only when lack of means precluded better. A temporary arrangement of hatching troughs was placed on the brook above the pond to hatch out the late eggs, because the fry hatched so late did very poorly in the water supplied to the hatchery, which deteriorates by becoming variable in temperature late in the season when warm weather sets in. This arrangement proved very satisfactory, and will be continued as built, if a larger permanent arrangement cannot be made. A shade was built over the upper tubs, and this probably in part resulted in larger fish and increased yield there. It certainly retarded the growth of algæ in the tubs.

The roadway passing the pond, the embankment of which serves as a dam, was widened, and the plank facing and wasteway rebuilt with heavy chestnut plank. The waterway was dropped two feet, the level of the water being regulated by means of flash-boards, as at times it is very advantageous to vary the level of the pond. A strong hand-rail was placed upon the pond side. The brook was diverted into a new channel at the lower side of the lot, where some small springs flowed into the brook, and a pond was built in the former channel of the brook. The soft mud and quicksand made the task very difficult, and increased the labor, as it was necessary to excavate much deeper than was desirable, and after planking to fill in with sand and gravel to get the right depth. The side of the pond next to the new channel of the brook was heavily planked and backed with gravel to prevent wash-outs.

The lower ponds are supplied with water which oozes in through the sand bottom, formerly the bottom of a shallow pond or swamp, and to increase this supply long ditches are run from the sides of the ponds to intercept the water that passes into the brook; these ditches were extended, wells dug, and finally tile was laid and the ditches refilled. The wells are shallow, generally not over 6 feet, but they increase the flow considerably. A pipe well was driven to the depth of 17 feet, but practically no flow was secured.

A new hen house, 9 by 27 feet, was built with waste lumber from repairs to the hatchery and old pens torn out. The shingles and finish were sawed from dead timber cut on the place. The barn having settled on the back side, it became necessary to lay a better foundation; and, as an abundance of stone lay within reach, it was thought best to take out the posts and lay a stone wall to the sill of the building, especially as it would result in a roomy basement for the storage of apparatus and green food for feeding hares in winter. This room was secured by a moderate amount of excavation, and it will require no great amount of work to make the whole space available. The water supply for the house having failed several winters through the freezing of the pipe from the hydraulic ram, the pipe

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was dug up, and, being badly broken, a new one was laid deeper, though possibly not below frost, because of the difficulties in digging. The grounds received less attention than usual, on account of the repair work required; but some stone and stumps were removed, and several rough places graded and seeded. Waste lumber was utilized in making a bridge below the hatchery, so that the strip of land lying across the brook, the best soil on the place, could be cultivated.

The road was gravelled in several places on the hill where it enters the grounds, because it was badly washed; and across the flat, where it was worn below the surface of the ground, adjacent land on both sides of the road was ploughed to the wheel track, making passing difficult in a season of mud. The road should be made a more suitable entrance, for the hatchery is a public place, visited by two or three thousand people each year, representing nearly all parts of the State, and including many leaders in public affairs. Through the latter part of the summer the land through which the road passes is used as a cow pasture, making it inconvenient, unpleasant, and at times dangerous for any one to reach the hatching grounds.

In May 5,000,000 green pike perch eggs were received from the United States Fisheries Bureau Station at Swanton, Vt. They came through in good shape, but immediately began to change, and in a few days were reduced to less than 1,000,000, all circumstances indicating poor fertilization. The hatching and distribution were accomplished with small loss. The glass aquaria proved to be unsatisfactory for holding fry, consequently these were put aside and only the large tank used.

In suggesting improvements for the future, it seems only necessary to renew the recommendations previously made, as they cover matters that are urgent. For the most part the improvements pointed out as desirable are not yet done; but it seems well at this time to offer a suggestion, that, if adopted, will aid in determining what work could be done advantageously.

The station should be examined with reference to improvements needed or likely to be needed, or extension likely to be undertaken, and anything done carried out in accordance with a comprehensive plan, looking to the most effective arrangement that the location will permit. The character of the work has changed, and many of the facilities for doing it are very unsuitable, while the extensive work of repairing done each year too often seems to perpetuate these unfavorable conditions. For many years the time spent in making these repairs has cut heavily into the time that should have been given to carrying out extensions and improvements, and they have often required the attention needed for routine matters; and, as fully as much will have to be done in the near future, whatever is done should be in the direction of a better-equipped and more convenient station, such as could be easily planned here. If the work of making repairs merely to restore things to their former condition continues, much of the effort must inevitably be misdirected.

Respectfully submitted,

ARTHUR MERRILL,
Superintendent.

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Report from the Hadley Hatchery.

Boston, Mass., Dec. 1, 1905.

To the Honorable Board of Fish and Game Commissioners, State House, Boston, Mass.

Gentlemen: — I beg leave to submit the following brief report of the work done at the Hadley hatchery during the season of 1904–05.

The stock of fish on hand at the beginning of the spawning season in 1904 was as follows: brook trout, adults 304, in the 75-foot pool, 2-year-olds 1,100, in 75-foot pool; rainbow trout, adults, 274, in section pools 1 and 2; brown trout, adults, 127, in pool between sections and the large pond; landlocked salmon, adults, 60, in section pool 3. In addition to the above-named fish, we had 142 yearling rainbow trout in section pool 4, also 40 yearling brook trout in the same section, besides 161 fingerling brown trout, 136 fingerling rainbow trout and 462 fingerling brook trout in the small pool back of the dam.

The mature fish were in excellent condition, and they yielded a fine lot of eggs during the spawning season.

I took the first eggs on October 31, when I secured 4,000 eggs from 6 brook trout. From that time on, by the advice of Commissioner Delano, I looked over the fish on alternate days; and the results proved this to be a wise plan, as some of the fish would not be ready at the time of taking one lot of eggs, and yet it would be unsafe to let them go for a whole week, as in the previous spawning season.

During the time in which I spawned the brook trout I secured a total of 246,000 eggs, the last lot of 2,000 being taken on December 21. The largest lot taken on any one day was 34,000, taken on November 7. The total number of brook trout spawned was 421. A great many of this number were of the lot of yearlings in the 75-foot pool. To this number of brook trout eggs must be added 100,000 which we received from the United States Bureau of Fisheries Station, at Leadville, Col., on February 17. This lot was exceptionally fine, and the morning after unpacking I found only 821 dead. The reason for this small loss was very simple, as the eggs were packed with the greatest care, and were protected against undue accidents during their transportation to Hadley.

From 26 brown trout I secured 32,000 eggs, from 3 salmon 4,000 eggs, and from 67 rainbow trout 84,000 eggs, making a total of 366,000 eggs taken at this station.

At the beginning of the spawning season the brook trout were, as stated above, in the 75-foot pool; and after the season was well under way we experienced considerable difficulty in getting the eggs from them, on account of the very cold weather causing the pool to freeze over about as fast as we could clear it. We finally transferred what fish remained in this pool to one of the sections, where we had no difficulty in handling them, as these places seldom freeze over.

The loss of eggs during the process of incubation and hatching was rather larger than usual, and was due in great part to the shortness of the water supply. An unfortunate accident occurred in April, and resulted in the loss of four trays (20,000) of rainbow eggs. This was

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due to ptomaine poison which came down from the liver fed to the young fry in the troughs above, as the four trays were in the lower one of the string of three troughs.

In spite of all these drawbacks, caused by the failure of the water supply, heavy loss of eggs and other unavoidable circumstances, we had a good lot of fry on hand during the season; but it looked at one time as if we might lose all of them, owing to the almost complete stoppage of the water in the hatching house.

We commenced the annual spring distribution of fry on April 25. Deputy Shea of Ware was again in charge of the work of delivering the trout to applicants, and by his thorough knowledge of that department of the business aided us materially in finishing up the distribution in a short time. All the applicants seemed pleased with the fish which we sent them. I personally delivered a few lots of brown and brook trout fry which went to Turner's Falls and Athol, respectively. The fry were not generally as large as in the previous spring, but were satisfactory.

Superintendent Merrill of the Wilkinsonville station came to Hadley on April 25 to get 30,000 eyed rainbow trout eggs and 40,000 brook trout fry, which he took back to keep for rearing purposes. It was not deemed advisable to keep any fry over at this station for rearing to fingerlings, as our experience in other years proved such a course to be worse than useless.

During the past summer we kept most of the rainbow trout, brown trout and landlocked salmon in the section pools. Through some unknown cause a good many of these, our best fish, died in one night. Mr. Barlow, at that time in charge of the hatchery, reported everything all right at 7 o'clock of the evening previous to the morning on which the fish were found dead in the pools.

Our chairman, Dr. George W. Field, and Superintendent of Hatcheries John W. Delano visited the hatchery and gave Mr. Barlow directions as to what should be done. Acting on these instructions he transferred all the fish that were still alive to the large pond. Since then we have had no unusual trouble.

The town of Hadley at a special town meeting the past summer passed a resolution to install water works in the village, and appointed a committee of three of their citizens to make an investigation and report the most favorable site for the construction of a reservoir. The first site proposed was on a brook known as "Shingle Mill Brook," a short distance west of the hatchery on the mountain. After a more extended search, however, they selected the brook that runs through the hatchery property, known as "Hart's Brook." The reservoir was built about one-half mile from the hatchery eastward toward the "Little Notch." The building of this reservoir on our brook will ultimately take the greater part of the water from our large pond, and thus make it an impossibility to keep a stock of brood fish here, as in previous years. This will greatly lessen the value of the property even as a hatching station, as all the eggs used in the future will have to be brought from a distance.

On May 29, pursuant to orders received from the office, I reported there for special work, and have been located there since that time.

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There were the same pleasant features about the hatchery work this summer as in the previous year. Every fine Sunday and some times during the week many visitors came for the sole purpose of seeing the fish take their regular daily meal in the afternoon. Others came who had an interest in the work because of its value in the studies which they were pursuing. Among such was a party of about fifteen students from Mt. Holyoke College, South Hadley. They were furnished, upon request, with trout specimens for use in their classes in embryology. Additional specimens were furnished later in the season. We are able to impart a little of our knowledge of the practical side of the matter by illustrating to them the methods used in securing the spawn from the fish, and the processes of incubation and hatching. These visits from students and people interested in the work in other ways bring us in touch with its different phases, and bring up many points that perhaps we have not thought of before.

On October 21 last I went to Hadley to oversee the work of changing the fish from the large pond to the small sections, to prepare for the spawning season.

The outlook for eggs this year is fair. We have on hand at the present time about 300 brook trout, 6 salmon, 47 brown trout and 100 rainbow trout. The greater percentage of the brook trout are males, and practically if not quite all of the brown trout are males.

In closing, I wish to thank the commissioners for their many kindnesses and assistance in the work, for by their help and instruction I have been able to accomplish many things that were perhaps unattainable otherwise. I also desire to express my thanks through this medium to Deputy Shea for his assistance and valuable help during the work of distributing the fry, and to Mr. George W. Barlow of Hadley, our teamster, who spared no efforts to make the distribution a success.

Trusting that this report will meet your approval, I beg to remain,

Obediently yours, W. RAYMOND COLLINS,
Superintendent.

The Adams and Winchester hatcheries, as usual, have been utilized to the limit of their possibilities. These are hatching stations solely, and were established during the time when applicants came in person to the hatcheries for the just-hatched fry. The more satisfactory method of rearing and distributing fingerling fish had not at that time been instituted.

The total number of fish distributed by the commission in the public waters of the State during the past year is as follows, including fingerlings, fry and eggs and adults: —

Trout fry,	999,000
Trout adults,	68
Trout fingerlings,	62,375
Pike perch fry,	800,000
Smelt eggs,	20,000,000
Total fish and eggs,	21,861,443

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In spite of the fact that section 65, chapter 91 of the Revised Laws, as given below, plainly states the intent of the law, the lack of penalty for its violation has led to cases where persons have made absolutely false statements for the purpose of securing trout fry and fingerlings for streams which are not open to public fishing. When such instances become known, no further fish have been furnished.

In view of this fact, we are of the opinion that no trout fry or fingerlings should be hereafter furnished except to such brooks as are throughout the entire length open to the public. To secure this, every applicant for fry or fingerlings should state in writing in the application that every owner or lessee of the land through which the brook passes has agreed that fishing on such land shall remain free to the public for the three years immediately following this stocking. Special attention is called to the law, which is explicit upon this point: —

REVISED LAWS, CHAPTER 91.

SECTION 65. No person, corporation or association shall be provided by the Commonwealth with trout or trout spawn to stock waters owned or leased by him or them or under his or their control unless he or they first agree in writing with the commissioners on fisheries and game that such waters so stocked shall be free for the public to fish in during the season in which the taking of trout is permitted by law.

There has been the usual annual mortality of fish, particularly in Lake Assowompsett, Pontoosuc Lake and others. We regret that we were unable to ascertain the causes and suggest remedies. During 1906, however, we hope to be able to give some attention to this important question.

We have, too, from pressure of other routine matters, been unable to inspect certain dams in the State where the present fishways are unsatisfactory, or where fishways should be established. We hope in our next report to announce progress. The flagrant case at Wareham Street, Middleborough, however, has been taken up, and is in a fair way to be adjusted.

GAME.

The Inland Fisheries and Game as a Valuable Asset of the State. — In addition to the reliable estimates made by our late chairman, Captain Collins, that reasonably good fishing and

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hunting in the State mean that at least $2,000,000 annually is spent within the State for such items as board, ammunition, fishing tackle, transportation, etc., the fish and game killed within this State are utilized to the economic advantage of the inhabitants, and chiefly as food.

From careful estimates based upon observations in all parts of the State, we estimate that there are to-day not less than 5,000 wild white-tailed or Virginia deer roaming about this State. We are of the opinion that by Nov. 1, 1908, when the present close season terminates, there should be at least 10,000 and possibly 15,000 mature wild deer. This should permit the killing of 1,000 to 2,000 male deer annually, representing a cash value of $30,000 to $60,000, as the annual profit from the Commonwealth's herd of deer. This amount will be distributed among the people of the State as meat which can be used as food by the persons killing the deer, or it may be turned into cash. The sole source of this amount of wealth is the natural reproductive increase, and is an asset just as tangible and marketable as the apple or tobacco crop. The employment of the deputies necessary to protect the deer is the only working capital required. The amount of money paid by the State to farmers for damages to growing crops represents the insurance upon the deer crop. The cost of insurance is reckoned in the cost of all business investments. The chances of failure of the deer crop are slight, and the harvesting is by those who count it "sport" and recreation rather than work.

In a similar way we have abundant covers, capable of supporting at least 50 to 100 ruffed grouse per square mile (if properly protected from illegal shooting and from the natural enemies of the nests and young, *e.g.*, the cat, fox, dog, raccoon, skunk, red squirrel, etc.), instead of the paltry 5 or 10 ruffed grouse per square mile as at present. The wild turkey is gone, and the pinnated grouse has been exterminated except one small isolated colony. The quail is maintained by the annual expenditure of $1,000 to $5,000 by the Massachusetts Fish and Game Protective Association and other public-spirited associations and individuals. Properly handled, the annual crop of ruffed grouse in this State should in an average season be not less than 25,000, valued at least at $25,000, and 20,000 quail,

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valued at least at $5,000. With the prohibition of spring shooting and proper protection to the breeding birds, the crop of wild ducks in Massachusetts should be at least 6,000, valued at least at $4,000.

Thus at a very conservative estimate the value of the State's game crop should not be less than $50,000, and might readily exceed $100,000. We have the territory, the wild berries, fruits, the waste cultivated fruits and grains, and especially the weed seeds and the insects in far greater numbers than at the time (still within the recollection of the men now living) when our fields and woods supported without difficulty five to ten times the present amount of game and beneficial birds.

Ruffed Grouse. — The ruffed grouse or partridge is easily our chief game bird. The past year has been favorable for the young, and there has been probably no marked decrease in numbers in this State. Yet the conditions surrounding this bird are annually becoming more severe. The cutting of the pine forests restricts the refuge areas, and the increasing numbers of gunners, with improved guns and more carefully trained dogs, making havoc which each year tends to diminish the number of breeding birds. The direct effect of human influence upon this most hardy bird has been a most alarming decrease of 50 to 75 per cent. in the past fifty years. There can be no worthier or more appropriate object for sportsmen or for lovers of nature, either as clubs or as individuals, to control areas suitable for protective covers and breeding grounds for our native game and other birds. Even a few acres of pine and cedar, where shooting is prohibited and where the woods are maintained intact, with a sunny glade and its stream of water, with barberries, old apple trees, bayberries and juniper and other fruits present through the winter, will do much towards maintaining not only this grouse, but also quail, woodcock and other wild birds.

We learn of very few instances where persons take advantage of chapter 92, Revised Laws, section 12, which permits the snaring of partridge by the owners of lands upon this land during the open season. Considerable snaring is done, however, in the State, but all the evidence indicates that it is not done by or with the knowledge and consent of the owners of

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the land. It would therefore be regarded as no special hardship if the law should be extended so as to entirely prohibit the snaring of partridges in the State. This would mark another step in emphasizing the fact that both insectivorous and game birds are the property of the State, and not of the person who owns the land upon which the bird chances to be temporarily; and that it is the privilege and the duty of every land owner to extend to such public property the utmost degree of protection, for the birds are of peculiar value not alone to the public as a whole, but in a very special degree to every land owner.

Forest Fires. — Our game birds, notably the partridge, suffer severely from forest fires. Fortunately, sportsmen are acquiring a greater interest and assuming larger responsibilities in the matter of preventing forest fires. In the past too many have been started by careless smokers, and particularly by the thoughtless dropping of the modern match so much used by hunters, "warranted not to blow out in a gale of wind." A present prolific source of trouble, too, are the bands of irresponsible aliens, who, not content with roaming our countryside in the summer and autumn for song birds, invade the woods and fields for mountain laurel, ferns and evergreens, for arbutus and other flowers which are carried to the cities, as well as for berries and other wild fruits. To such people many disastrous forest fires have been directly traced. It is the duty of every citizen to check the courses of forest fires, which are a prominent source of danger to some of the most valuable assets of the State; since the birds, trees and wild flowers contribute so largely to making our rural districts attractive for residential purposes.

Woodcock. — The facts given by Dr. E. H. Forbush in his admirable special report upon the "Decrease of Certain Birds," in the fifty-second annual report of the Massachusetts State Board of Agriculture, are a fair statement of the present condition of this bird: —

The woodcock formerly bred abundantly in small swamps and alder runs throughout the State. Thirty years ago it bred in all suitable places about Worcester, but within ten years from that time the breeding birds were shot off. Mr. Gerry has kindly lent me a memorandum book kept by his father, Col. E. Gerry, in 1838. He tells me that the

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woodcock recorded in this book were shot in Stoneham. Colonel Gerry commenced to shoot woodcock in July, therefore the birds shot must have been those breeding in the locality. On July 7 he shot 22, for which he received only $2.75; on the 8th he shot and sold 42; on the 9th, 9; on the 16th, 20; on the 21st, 6; on the 22d, 12; on the 23d, 15; on the 27th, 8. On the 11th he shot 27 "birds," probably woodcock by the price. These woodcock were sold in Boston at 12½ to 25 cents each. After the first of August the score of woodcock shot falls off rapidly. Here are 161 resident woodcock, young and adult birds, killed by one man close to Boston in July. There were no doubt many other shooters operating about the city. No wonder that breeding woodcock disappeared rapidly from the region near Boston. The woodcock is decreasing all over its range in the east, and needs the most stringent protection. Of 38 Massachusetts reports, 36 state that woodcock are decreasing, rare or extinct, while 1 states that they are holding their own, and 1 that they are increasing slightly since the law was passed prohibiting their sale. These reports refer mainly to birds breeding in Massachusetts. In the fall of 1904, in a few sections, there was a good flight of birds from the north.

The woodcock is one of those birds which has also fallen victim in large numbers to the numerous telephone and telegraph wires, on account of its habit of flying to the feeding grounds at dusk. Unlike the ruffed grouse, which, on account of its low-scaling flight, is killed by the modern wire fences, the woodcock and rails fly at about the ordinary height of telegraph wires. On account of their crepuscular habits they are each night exposed to these dangers, where the ordinary birds are thus exposed chiefly or solely during the spring and autumn migrations.

As in the case of the ruffed grouse, better protection to the breeding places of the woodcock would be of exceeding advantage. There are many farms in this State where without serious loss a small tract known to be the shelter of woodcock could be left uncut and undrained. The writer knows that one such tract, an area of about 50 acres, which has long been known as one of the best woodcock covers in eastern Massachusetts, has been thus protected for the past four years, to the notable increase of the breeding birds.

Quail. — The "bob-white" or quail suffered very severely in the two successive hard winters of 1903 and 1904. Unfortunately for us, Massachusetts is practically the northern limit of quail distribution, and unless we can devise practical

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and general means of caring for these birds during our most severe winters, we shall oftentimes be without his cheery whistle, and the insects will multiply the more rapidly in his absence. A succession of favorable seasons may bring the quail again to the southern and eastern sections of this State, but the increase is liable to be wiped out again unless serious, systematic and earnest efforts are made to protect what quail we have. This seems more feasible than to spend money for birds we know not of. Thousands of quail are annually killed to no purpose in the often ill-advised attempts to naturalize southern and southwestern quail in Massachusetts. The only chance for maintaining the quail is in a state of semi-domestication; and all possible efforts should be bent to devising some practical method of rearing our "bob-white" in confinement. Suitable locations and individuals should be sought out for such work, and should receive the hearty support, both personal and financial, of the numerous sportsmen's associations. Every one hundred dollars thus employed promises far better results than every five hundred dollars spent in the purchase and liberation of travel-worn unacclimated birds.

The reputation which "bob-white" has acquired is well deserved, for there are few birds of greater value on the farm, and none more worthy of or requiring greater protection.

Fortunately for all concerned, the market demands for quail are distinctly less than they were five years ago. The people generally are aroused to the fact that one quail in the bush is worth ten on toast; and it appears probable that public sentiment will demand very properly a strict non-sale law on quail, whether killed in this State or elsewhere. This will be for the advantage of agriculture and of rural dwellers, as well as of the true sportman. In addition, it will strengthen the hands of our sister States which have recognized the value of the quail as an asset of the State, and have passed laws forbidding the sale and shipment of these birds beyond the State limits.

The Upland Plover. — The Legislature this year placed a close season for five years upon the Bartramian sandpiper or upland plover, during which it may not legally be killed. These birds are most valuable to the farmer, for the reason that they

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feed largely in the grass lands upon cutworms, grasshoppers, army worms, etc.

Forbush [1] says: —

> The Bartramian sandpiper, commonly known as the upland plover, a bird which formerly bred on grassy hills all over the State, and migrated southward along our coasts in great flocks, is in imminent danger of extirpation. Thirty-five years ago these birds bred commonly within the city limits of Worcester, about Fitchburg and in the country around and between those cities. A few still breed in Worcester and Berkshire counties, on Nantucket, and possibly elsewhere in the State, so that there is still a nucleus, which, if protected, may save the species. Their former abundance is shown by some of the statements of the old gunners. "When I was a boy, nine years old, my father killed 90 upland plover in one day. He killed 16 without picking one up." (Gerry.) This was about seventy-five years ago, in the days of muzzle-loading guns. "Breeding birds, or those living on Nantucket, have fallen off 66 per cent. in the last fifteen years." (Mackay.) "Upland plover extinct here from hunting, but breeds sparingly in northern Worcester County." (W. S. Perry, Worcester.) Five reports from localities where this bird formerly bred give it as nearing extinction, and four as extinct.

This bird, although very shy, has been persistently hunted for the table. Further, as a ground-nesting bird the encroachments of civilization, with the accompanying cats and dogs, have seriously interfered with the rearing of young.

The Pinnated Grouse (*Tympanuchus cupido*). — It is not generally known that a small remnant still remains in Massachusetts of the large number of pinnated grouse or "prairie chicken," locally called the "heath hen," which formerly ranged the scrub oaks of much of the United States east of the Alleghanies from Massachusetts to Virginia. It was especially abundant on Martha's Vineyard, where it still persists, and Long Island, where it disappeared less than thirty years ago. On the mainland it was abundant through Massachusetts, Rhode Island and Connecticut, and middle and southern New York State. In 1885 this bird was first described by our distinguished Massachusetts ornithologist, William Brewster, Esq.,

[1] E. H. Forbush, "Special Report on the Decrease of Certain Birds, and its Causes, with Suggestions for Bird Protection." Fifty-second Annual Report of the Massachusetts State Board of Agriculture, Boston, 1905.

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of Cambridge, as being distinct from the common pinnated grouse (*Tympanuchus americanus*) (or prairie hen or chicken), now practically confined to the Mississippi valley. It is now generally known to ornithologists as Brewster's grouse. Since this bird is resident throughout the year, surviving our fiercest sleet and snow storms, of excellent flesh, and a game bird, it is not too much to say that were it to-day present upon the mainland it would be carefully cherished by our sportsmen and bird lovers, and would not be permitted to pass to the very verge of extinction. For this reason serious and well-devised attempts to re-establish this bird in sufficient numbers to place it beyond the possibility of extermination should be actively undertaken. First of all, measures should be immediately instituted to rigidly protect the present number (estimated at about 100) for a period of at least five years. Inasmuch as many are now killed by or for collectors, who are willing to pay $20 to $30 for a specimen, the fine for killing, or having in possession a bird of this species killed in Massachusetts, should be at least $100.

It is hoped that arrangements for breeding this interesting and valuable bird under the immediate direction and control of this commission may be completed this summer, for the purpose of establishing this bird where it may again become a source of pleasure to the bird lover and to the sportsmen.

The National Association of Audubon Societies has called attention to the importance of such measures in its official organ, "Bird Lore," for 1905, page 329: —

> There is one important matter that should receive the earnest attention of the Massachusetts public, and especially the members of the Audubon Society; in fact, it is of interest to all persons who care for wild life. The few remaining heath hens on Martha's Vineyard will disappear in a short time, if a law making a close season for at least ten years is not passed by the next Legislature. The fine should be not less than $100 for killing one of these birds or taking any eggs, and they should have special protection by an efficient warden. The small number left is all that exist anywhere on the globe, and when they pass away another race of birds will be extinct. This colony is fortunately so situated that it can easily be protected, and the experiment of trying to save a species of birds on the verge of extinction will be of great scientific interest. The National Association urges upon the citizens of Massachusetts immediate action, and pledges its influence and help.

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Biological Survey Bulletin No. 24, United States Department of Agriculture, 1905, says: —

If this bird can be saved from extinction and introduced into many of the eastern States it will be much more likely to succeed, on account of its woodland habits and narrow range, than the prairie hen, which requires a more open country, and usually does not take refuge in woods from its enemies. Experiments with the heath hen must be made soon, however, or it is likely to become extinct.

Shooting Season. — Upon the shooting season in general the Springfield "Republican" of December 3 well said: —

The shooting season of 1905 came to an end Thursday, and, viewed in retrospect, sportsmen are much surprised to find what a really satisfactory year it was for game birds, after all. Last winter there was an impression among the lovers of the dog and gun that the fall was to be a poor one in the woods and fields. The winter had been unusually severe, and the quail had been mowed down by the deep snow, so that those surviving were practically the few hand-fed by kind-hearted farmers. Not even the most optimistic hoped that the quail shooting this fall would be up to the average of the past few seasons. And they were not disappointed. A few years ago, when the "bob-white" was heard whistling in nearly every field, it looked as if we were to have them with us in great plenty for years to come. It was said by all that the quail would be our only game bird for years; but all-wise nature ruled otherwise, for some reason.

This season it was the ruffed grouse that furnished the best shooting, and there were more of these great New England game birds slaughtered than have fallen in recent years. They were heard drumming along the brooks in the early spring by the people who were casting their flies for trout, and during the summer many were seen in the roads, dusting themselves and taking a sun bath. When the season opened, October 1, many hunters went after them at once, in spite of the hot weather and the hardship that the sport put on the dogs. Of course the leaves were not off the trees then, and not many birds were killed; but the early gunner did good service to the grouse, for he made them gun-shy and wild, so that when the leaves fell the birds were fairly wise. And a ruffed grouse does not need a great deal of schooling in order to take care of itself. The best of the grouse shooting came last month, for the weather was delightful, the ground was fairly dry, and it was good to be alive and in the covers. It has been many years since so many ruffed grouse were killed in this section, and some big bags were brought home. In fact, the shooting was so good that it went to the heads of a number of local sportsmen, and they killed, seemingly, for the love of the killing. There certainly is nothing sportsmanlike in boasting of a string of fifteen ruffed grouse in one day, as some people have done. These men are to be pitied, and should stop talking about having restrictive game laws passed until they learn

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the true meaning of the name of sportsman. A few years ago it was noticed that the ruffed grouse were plentiful to the east and west of this city, but were scarce about here. This season the conditions were changed. To the north and south there were few birds, but about here, many. This was probably due to the fact that we had a dry spring, and the chicks had a chance to grow up. Rainy weather in the early spring is bad for the tiny ruffed grouse, and there was rain to the north and south to prove this. While many birds have been eaten, there are still a goodly number left in the woods, and, if the winter is not too severe, there should be many survivors of the snows and frost to breed next spring and restock the depleted covers.

Not so many woodcock nested in this vicinity as have in past springs, and the early woodcock shooting was not good. The warm fall held the flight in check, and it was feared that it was to be a poor season, as no birds from the north came in before the middle of October. There is an old belief among sportsmen that if the flight does not begin before October 20, it will pass over us. This year was an exception to the rule. The best woodcock shooting came during the last week in October, and those who were in the woods at that time say that they found a large number of the long-billed birds. But a strange thing was noticed about the flight this year. The birds did not frequent their usual covers, and the quiet of the birch-clad hills was unbroken by the shrill whistle. It was so dry that the birds followed the valleys, and it was there that the good bags were killed. On the whole, the woodcock shooting was as good as it has been in other seasons, and the hunter has no ground to find fault.

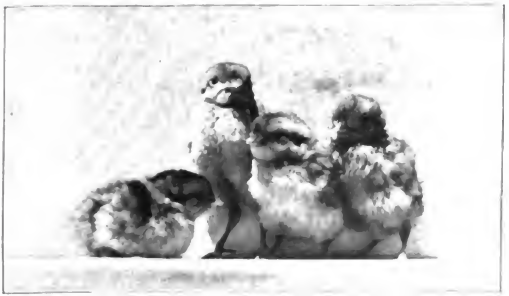
A writer says, in the Springfield "Republican" of December 3: —

With the ruffed grouse getting more plentiful, and the woodcock holding its own, there is only the little quail to think about. It will be necessary to liberate a number of these birds next spring in order to restock the fields, and it would be a good thing if a closed season of five years' duration on them could be enforced by the Legislature. This cannot be hoped for, however, as the marketmen make too much money on the quail, and if the "no-sale" law were to cover the "bob-white," the marketmen would suffer. But the farmer should see to it that he does. The quail is one of the farmer's best friends, and these men are really the ones who are the most affected by the game laws, as it is their fields and woods that are the home of the sport. More and more farmers are posting their lands every year; and if they would band together and advance good game laws, they would save the birds from the so-called sportsmen, who talk reform, but seemingly do not carry it with them when they go afield. Our laws are wise as they now stand, except for the clause allowing the four weeks of quail shooting. This must be changed, and, as the hunter will not do it, the farmer must.

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RUFFED GROUSE ONE DAY OLD.



RUFFED GROUSE—THREE DAYS OLD.



RUFFED GROUSE—SEVEN DAYS OLD

Photographs from life by C. F. Hodge

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The important experiments by Prof. C. F. Hodge of rearing ruffed grouse in confinement have been watched with great interest by many persons. His report follows: —

WORCESTER, MASS., Dec. 1, 1905.

Dr. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

MY DEAR SIR: — Permit me to hand you herewith a report of my experiments with the ruffed grouse during the past season.

The grouse were very easily brought through the winter. For housing they were given the choice of a large flying cage filled with trees and brush, and sunny compartments on the south side of a small building, also filled with branches of different trees. In severe weather they were observed to spend the days mainly in the building, wallowing in the dry earth with which the floor was covered, or perched about in the branches. The nights were always passed outside, either perched in the trees or within their extensive "snow burrows."

Water was provided daily, but there was no evidence that they touched it while snow was on the ground. On the other hand, they were seen frequently eating snow.

For food they were constantly given free choice of as large a variety as possible. Budding brush of apple, black cherry, poplar, maple, willow, spruce, oak, chestnut and some others was liberally supplied, and they were observed to bud mainly on poplar and apple. They were also frequently observed to eat the dry brown leaves — oak, apple and chestnut — with which they were supplied. Rose hips and thorn apples were eagerly eaten, and the berries of black alder were taken sparingly. Their main foods, however, consisted of seeds and grains, — corn, kaffir corn, sunflower seeds, wheat, rye, buckwheat, millet, oats and barley. Oats and barley were eaten sparingly; peas and beans were refused. Sunflower seeds, kaffir corn, corn, buckwheat and wheat were preferred in the order given. The birds also ate all the acorns and chestnuts that could be procured, and also quantities of cranberries, apples and cabbage, with which they were always supplied.

In the spring their yard was spaded, freshly sodded in part and the rest thickly planted with ferns from the woods, mosses, wintergreen and sweet fern. So eager were the grouse for the fresh fern leaves, — although they had cabbage, lettuce, plantain and many other growing plants, — that among the scores of large clumps planted in the enclosure not a frond was allowed to unroll. I should suppose that the tender fern buds must form a staple article of food for the grouse in the early spring.

Only one of the birds reared from the egg was a cock. He was large and vigorous, and from the time that he first began to strut in September I expected daily to hear him drum. However, the fall and winter passed, and about the middle of February the strutting began afresh, but no sign of drumming. The other cock, captured the fall before, but tame and entirely at home in the enclosure, began persecuting his rival. I therefore put him in a cage by himself some distance

from the rest. I hoped in this way to ascertain the motive of the grouse in drumming. If the lone cock drummed, it might indicate either a mate call or a male challenge. If the other cock answered, it would suggest the male challenge. However, nothing happened, and as the middle of April approached I was about ready to conclude that probably both cocks were yearlings, and that they would not drum in captivity or without instruction from the birds in the wild. Just at this juncture a letter from Mr. J. B. Battelle was received, in which he stated that his ruffed grouse (captured birds) never drummed in captivity, because, as he thought, the hens were left with the cocks. Accordingly, as a last resort, I shut up all the hens. The cock was greatly excited, and ran eagerly about searching for his mates; then, almost before I had time to take in the situation, he sprang to the top of a bit of stone wall, and, stretching himself up to full height, began to drum. As the wings moved faster he slipped off, and finished his first performance on the ground. This was April 14, and three days later the first egg of the season was laid. For about three weeks he continued to drum whenever the hens were shut up, but never when they were with him. During a drumming bout he would perform about once in three minutes, the act itself lasting from twelve to fifteen seconds. Numerous photographs were taken, but after the first two or three days the cock became so pugnacious that he would stop drumming to fight, if any one (except a certain little girl) came near the enclosure. This subject is more fully treated in the November number of the "Country Calendar," 1905.

Breeding. — By spring the flock consisted of three hens and two cocks. One of the hens had been reared from the egg; the others had been captured the fall before. Only the hen reared from the egg laid. As just stated, the first egg was found April 17. This was dropped on the floor. The hen then made her nest in the most secluded corners of the house, — an ordinary hen's nest, in fact, — and laid the remaining nine eggs of her clutch in this. The last egg was laid May 3, and May 4 she was found brooding. Five of the eggs hatched vigorous, normal chicks on the morning of May 27, making the incubation period twenty-four days. Nearly mature chicks were found in the other eggs.

I was unfortunately obliged to be away when the brood came off, and for some days before. A letter received from Mr. Battelle on the eve of my departure stated that if, as the weather got warm, the hen spends a good deal of time off the eggs, do not be alarmed. She knows better than we whether she is overheating her eggs or not. I regretted my neglect to show this letter to the one who was left in charge at first, but have since contented myself with the thought that the lesson was worth the price. The hen was thought to have deserted her nest, five of the eggs were slipped under a brooding bantam, the hen returned to her task and just five of the eggs hatched. Which five is not altogether certain, but probably the five that were not cooked under the bantam, although I have had no trouble with bantam hens in hatching the eggs. There is probably some difference in the body temperature of the two birds, though I have not tested this matter.

The cocks of the ruffed grouse are evidently polygamous. I observed the "wild" cock mate with the two "wild" hens. The hens, however,

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RUFFED GROUSE REARED FROM THE EGG.
Photograph from life, October 3, 1904, by C. F. Hodge.

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permitted mating but once, and after mating, if left together, the cock will peck the hen to death. Mr. Battelle writes me that he had a hen killed in this way, "her skull being pecked as bare as a billiard ball." I therefore watched the pair very closely after seeing them mate, to ascertain whether Mr. Battelle's was an exceptional case. The pair got along peaceably for three days, but early in the morning of the fourth day I found the cage filled with plucked feathers, and the hen's skull pecked bare as a "billiard ball." Had I been a few minutes later, she would probably have been killed. I put about forty fine silk stitches in the mangled scalp, under antiseptic precautions, and the hen was apparently as well as ever. The above would indicate that mating occurs but once in a season, that the cocks drive the hens away after mating, and that probably the drumming is for the purpose of attracting unmated hens.

Rearing. — My permit for the year allowed me to take seven eggs. Mr. M. Leticq had under permit captured a brooding ruffed grouse and made the experiment of removing the bird and nest to his yard, to see if she might not continue sitting, and bring off her brood. Not wishing to risk all the sixteen eggs at first, Mr. Leticq brought me ten, and had them put under a bantam. The grouse hen deserted and soon died, so these eggs were made to serve my purpose. I simply wished to have some eggs hatching about the time my own would come off, so that, in case those laid in confinement were not fertile the first year, I could give the grouse hen some chicks to bring up. Since the eggs laid in captivity proved fertile, the chicks from these eggs, all of which hatched, were allowed to remain with the bantam hen.

Rearing the young birds for the first three weeks was, aside from extra precautions in preparing the foods, practically as easy as rearing so many bantam chicks. They grew rapidly, and, the weather at first being favorable, developed into apparently hardy, vigorous specimens, perfectly clean and free from vermin or disease. They were given the run of the large cage, and sought the shelter of the house at night. At the end of a week they could fly short distances, and when two weeks old began to roost by themselves, instead of brooding with the hens. In fact, they roosted in the branches with which the house was filled, alongside their respective mothers.

The grouse mother was quiet, and at first brooded her chicks much more than the hen. She never scratched, was extremely solicitous of her brood, — so actively so that it was necessary, after a first accidental encounter with the bantam hen, to protect the hen from her. She was not seen to offer her chicks an insect, maggot or other morsel of food, as hens do; but this was not necessary, since the chicks were perfectly able to feed themselves. She was also never seen to partake of any of the food provided for the young. She was in every respect a model mother. The contrast between the bustling, blustering, scratching hen, — a bottomless pit for maggots or custard, — and the gentle partridge, emphasizes the point that as quiet hens as can be obtained should be selected for rearing the grouse chicks; but after doing this, and after trying all sorts of schemes for inducing the hen to brood her chicks as much as possible, I often felt that I would like to amputate her scratching

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legs close up to her head. Still, in spite of the hen's fussiness, all the chicks throve for the first three weeks.

About June 20 we had a severe, cold rain. The chicks were carefully housed, and did not get wet. Still, they showed signs of being chilled, and went back to brooding again. They were now too large to find shelter under the hen, though the partridge could cover her five. To cut a long story short, all but one of the chicks (one belonging to the grouse hen) took sick and died during the storm or within a few days after.

Fortunately, Prof. W. E. D. Scott happened to visit me at this time, and he freely gave me the benefit of his long and successful experience in rearing and especially in feeding young wild birds. He also referred me to Dr. George Creswell, the leading English authority on bird hygiene. All the symptoms, as well as bacteriological tests made in my laboratory by Miss Anna A. Schryver and Mr. Charles W. Miller, left little doubt that acute septic fever was the cause of death in all cases. According to Dr. Creswell, the feeding of egg is a most fruitful cause of septic fever in all sorts of wild and cage birds. It seems that this food is too rich, or is not well absorbed, and the part which remains unassimilated in the intestine forms the best possible food for the germs of septic fever to grow in. If the weather is fine, and the bird has plenty of exercise in the fresh air, this may not result seriously; but let the bird encounter some unfavorable condition, — get chilled or wet, or be confined for a day or two, — and it is dead almost before we notice that anything is the matter with it. I think the principle here involved may prove of great value in rearing young pheasants and turkeys and a number of other birds. In case I am able to attempt the rearing of partridge chicks again next spring, I feel reasonably certain that, barring accidents, I can bring to maturity every chick hatched. I shall substitute "ants' eggs," and a great variety of insects obtained by sweeping the grass with insect nets, for custard and all forms of egg food, use as much coarse foods — greens and fruits — as possible, and carefully avoid overfeeding. While I regret most keenly the loss of our beautiful flock of young birds, I feel that the lesson learned is worth the cost many times over. I think, in fact, that it will definitely insure the success of our experiment in the artificial propagation of the ruffed grouse.

It only remains for me to add than on October 1 my entire flock of tame grouse was poisoned. The poison used was white arsenic, which was pasted over fragments of acorn kernels and thrown into the grouse enclosure. All the birds came through the summer well, and were in perfect health and feather. A quantity of the poisoned acorns was gathered in the enclosure, and chemical tests leave no doubt as to the poison used. Fragments of the fatal acorns were found in all the dead birds. The greatest obstacle which I encountered in my work was the plague of uncontrolled cats which infested the neighborhood. In attempting to keep my premises clear of these pests I must have incurred the spite of some unprincipled person, with the result above stated.

I have, however, accomplished the chief objects of our experiment. I have succeeded in rearing the ruffed grouse to maturity from the egg,

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RUFFED GROUSE FOUR MONTHS OLD.
Photograph from life by C. F. Hodge, October 3, 1904.

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have been enabled to study in detail the foods, habits, instincts and character of the species as it has never been studied before, and I have demonstrated that the grouse will mate and rear young in conditions of domestication. I had hoped to go one step farther, and show that this could be done on a considerable scale, and rear a number of the birds which the commission could use for purposes of further propagation. I had also some correspondence with reference to sending some of the birds to England, for purposes of introduction and experiment there; and also with reference to placing pairs of the tame grouse on country estates from which they had been exterminated, where they would be carefully protected and encouraged to increase. All these plans will now have to await the rearing of another flock, which I hope to do next spring.

I wish to acknowledge the receipt from the Massachusetts Fish and Game Protective Association of a grant of $200, given without my solicitation or knowledge, for the furtherance of this work.[1]

Respectfully, C. F. HODGE.

In addition to the propagation of fish, the Sutton hatchery has facilities for propagating game birds and mammals. A report upon this branch of the work follows: —

STATE FISH HATCHERY, WILKINSONVILLE, MASS., Dec. 30, 1905.

Commissioners on Fisheries and Game, State House, Boston, Mass.

GENTLEMEN: — For the present season the brood stock of pheasants was somewhat smaller than usual, and was reduced considerably during the breeding season by the loss of several hens by escape and death; this, with the fact that the birds laid less than usual, resulted in a great reduction of the number of eggs; the number laid amounted to 833.

The eggs were laid very early, which is a very serious disadvantage, as the benefit of the warmest summer weather for rearing chicks is lost. The eggs hatched fairly well, better than usual, but the chicks, benefited by favorable weather, did well until late into October. Some were lost because of overcrowding. The birds were held in an enclosure awaiting distribution, which was delayed, meanwhile becoming weakened. Eighteen died, or were killed by rats which attacked them while weak. When removed to a fresh pen, no further trouble was met with. In August and September 88 were shipped and liberated, and during the rearing season 15 young and old escaped and were not recaptured. Four males were liberated later in the season, when it became necessary to empty pens for use in holding other stock. At the close of the year 26 old and 22 young were on hand, — enough to fill the present breeding pens.

November 1, 2 pairs of black grouse arrived and were placed in pens which were emptied of pheasants to receive them. One pair was placed

[1] A more detailed report upon the rearing of the ruffed grouse in domestication appeared, with numerous photographs from life, in "Country Life in America," for April, 1906.

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in a small pen, and, although they were protected as far as possible from outside influences, by brush placed in and around the pen, they remained untamable, and both died before the middle of December. The other pair was placed in the large central pen, surrounded by other pens containing pheasants; but of this pair the female arrived crippled, and did not recover; the male was soon tamed in a degree, remaining in the open parts of the pen, instead of hiding persistently like the others, and appears to be in a measure contented. The birds fed freely, stripping pine and hemlock brush, eating all kinds of fruit, nuts and berries, especially grapes, acorns and cranberries. They arrived at very short notice, and the best that could be done was to empty some pheasant pens and fix them over with brush; but probably the former use of the pens did not affect the result, though possibly the difference in size did. The small pen in which the pair died contained 144 square feet; the larger pen, 864 square feet.

The Belgian hares bred during the winter, and by spring a considerable stock was available for distribution; but they were held so long that many were lost from overcrowding, for not enough pens were in readiness for such a number of large ones. Many of the remaining ones were used in renewing the brood stock, which was reduced by losses and by the rejection of many unfit and diseased ones. Twelve of these were liberated about the hatchery grounds. In July, 20 hares, some nearly full grown, were liberated; but at this time for a period of nearly three months breeding was practically at a standstill, the few that did breed neglecting or killing their young. In the autumn months breeding was quite rapid, though with much loss from neglect by the parents, amounting to about one-half. At the approach of winter 50 young were ready for distribution, but it being late for that, they were held, to be liberated the following spring.

April 1, 4 male and 8 female Northern varying hares were received from Shelburn, N. H. They arrived in good condition, and were placed in movable Belgian hare coops, where they were kept until winter, when they were placed in pheasant pens. They did not breed, — probably would not, in such unsuitable pens, even if they had become more tame; but some progress was made in taming them, and it is probable that in better quarters they may breed. One escaped soon after arrival, because of some one tampering with its coop at the time of a forest fire around the hatchery, when a great crowd was present. Two in a lot that seemed untamable died before being here long; 2 died from injuries received in the pens, and 1 from intestinal trouble after being here six months.

The hares placed in secluded pens did not become nearly so tame as those placed where they could see people passing, but could not be too closely approached. No addition was made to the pens, and a few movable emergency coops were made for hares.

Much work was done on the buildings, chiefly on account of the needs of the game birds and animals; and ample room was provided for the hens, besides storage room for green feed, so that a supply can be kept for winter use; consequently, as far as material can be provided, all time available for making improvements can be devoted

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RUFFED GROUSE.

This specimen, captured September 26, was photographed November 2, 1904.

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to making new pens, as these are now needed more urgently than anything else. All pens made for rearing birds and animals have been for pheasants and Belgian hares, and these, being partly domesticated, will breed under conditions approximating those provided for domestic stock; but in breeding wild game little can be hoped from similar arrangements. In planning the pens for use in that work it will be necessary to make them large, so that the vegetation will not be killed or the ground become foul; more secluded, with thickets of low brush, so that the game will have shelter, but arranged so that it will become tame in a measure by the attention given it. Many admirable locations can be found on the grounds for the needed pens, particularly on the west side, above the ponds. There many pens can be located with a supply of running water, but having the greater part of the enclosure dry upland, sloping to the south.

Respectfully submitted, ARTHUR MERRILL,
Superintendent.

From the Winchester breeding station there have been distributed during the year 378 ring-necked pheasants and 156 hares. The present stock on hand consists of 172 ring-necked pheasants and 56 hares.

Of the 12 "black game" purchased in Sweden by the commission for breeding experiments, only 1 rallied from the long confinement incident to the voyage. The 8 capercailzie which were presented to Commissioner Brackett by Swedish friends similarly succumbed soon after arrival. Commissioner Brackett writes: —

Had we a preserve where they could have been given more natural environment, the results would in all probability have been more satisfactory.

FISH AND GAME LAWS AND THEIR ENFORCEMENT.

Summary of Law-enforcement Work in 1905.

Total fines imposed,	$4,103 59
Fines from arrests by paid deputies,	3,174 63
Fines from arrests by unpaid deputies,	928 96
Total number of counts taken to court,	353
Total number of persons arrested,	319
Convictions,	326
Cases discharged,	25
Defaulted,	2
Cases filed,	50

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Classification of Arrests during 1905.

OFFENCE.	Number of Arrests.
Violation of shellfish laws,	52
Seining in great pond,	4
Illegal possession of game,	13
Setting nets,	9
Short lobsters,	22
Mutilation of lobsters,	2
Robbing traps,	2
Hunting out of season,	5
Sunday hunting,	87
Hunting without license,	25
Setting trap,	1
Setting snares,	1
Killing song birds,	20
Shooting bittern,	2
Shooting sea fowl,	2
Killing deer,	4
Setting fish trap,	1
Sawdust pollution,	15
Spearing in Connecticut River,	6
Fishing with trawls,	3
Illegal fishing,	7
Short trout,	11
Selling trout,	1
Fishing closed waters,	24
Shooting pheasant,	1
Shooting from power boat,	2

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RUFFED GROUSE STRUTTING — Photograph from life, October 17, 1904, by C. F. Hodge.

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Classification of Arrests during 1905 — Concluded.

OFFENCE.	Number of Arrests.
Taking game out of State,	1
Dog chasing deer,	10
Possession of bird feathers for millinery purposes,	1
Short bass,	2
Possession of seed lobsters,	1
Short pickerel,	3
Sale of game birds,	5
Smelts in close season,	1
Using ferret,	6
Killing game with ferret,	1

While the foregoing chapters indicate that it is not the sole function of this commission to enforce the fish and game laws, reference to the above table indicates in part the substantial progress which our deputies are making in protecting public property. Notwithstanding the practice of the deputies to show leniency to such persons as may unintentionally violate the law, — and many first offenders have been merely warned, — the total number of persons arrested is 54, or 15 per cent. larger, and the number of cases discharged is 11 less, than in the previous year. The percentage of offenders of foreign birth (judging by name) is reduced nearly one-half. This appears to be referable directly to the license law for alien foreign-born hunters.

This indicates, not that there has been a greater number of offenders this year, but that the laws have been more satisfactorily enforced. The smaller number of cases discharged indicates an increased efficiency in the personnel of the paid deputy force, and improved judgment in making arrests and prosecutions. The results are creditable when it is noted that only in rare cases is the Commonwealth represented by a law-

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yer. In nearly every case the deputy is compelled to act as complainant and as the prosecutor, managing the case and making the plea for the Commonwealth.

The paid deputies, in addition to detective and on occasions athletic abilities, are required to have an extensive first-hand knowledge of the woods and streams, and a rather close acquaintance with the habits of all those creatures, both fish, flesh, fowl and hunter, law-abiding or lawless, which frequent these often remote regions. In addition to the above qualifications, he must be a keen and careful observer, capable of drawing correct inferences from his observations; he must be courteous, cool and quick-witted, swift and accurate, judicial and judicious; exposed to temptation of all sorts, he must remain impregnable. His bodily and mental vigor must carry him through night watches in the woods or by the waters. His is a daily task; the Sabbath is usually his "busy day," on account of the Sunday gunners. In all seasons the woods and ponds must be visited, and the well-being of their denizens considered. The most advantageous places for introducing trout fry must be recognized and remembered. Places where fry and fingerling fish have been introduced must be frequently visited to note the results. He must know the best methods of transporting live fish and animals. Above all, he must be truthful, of transparent honesty, and singleness of purpose to advance the best interests of the public. It is seen that the enforcement of the fish and game laws requires a specialized type of man. We believe that each year marks progress in securing such men.

In practical working the active force consists of sixteen paid men, who work usually in pairs, under directions from this office. Each man makes a daily report of his movements and observations. As the paid force has developed in effectiveness and numbers, the unpaid force has been gradually reduced. By this means the grave criticism to which the fish and game laws are subject, namely, the fact that one-half the fine goes to the complainant, thereby sometimes arousing improper motives for prosecution, can be minimized through the restriction of the appointment of unpaid deputies to men of proved probity of character and mature judgment. By the system of

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paid deputies all the fines imposed are turned into the treasury of the Commonwealth; there is no incentive to prosecute for the sake of the fine. This leads to a more satisfactory public spirit and respect for law. It develops greater responsibility on the part of the deputy, and more complete control over the actions of the deputies by the commissioners. It develops an *esprit de corps* which wonderfully increases the law-enforcing efficiency of the department.

The following report of Deputy Shea indicates the attitude of the paid deputies towards the work entrusted to them: —

To the Commissioners on Fisheries and Game, Boston, Mass.

GENTLEMEN: — I have enforced the law in this and other sections of the State where I have been sent, to the best of my ability, my aim being to enforce the law without spite or prejudice, deal sharply with wilful lawbreakers but leniently with ignorant and unintentional violators, and squarely with all. I find such a course has engendered a better feeling among the sportsmen in the forty or fifty different cities and towns which I have visited the past year on official business. In my estimation a great deal of good has resulted from the enforcement of present laws, the public generally favoring them and desiring a sane enforcement of them.

Deer have been more numerous this year than ever. There is not a locality which I have visited where deer have not been seen, and the farmers in this vicinity report seeing as many as six at one time in their fields. No doubt they are rapidly increasing.

The past year has been a record-breaker for woodcock, and I can truthfully say that woodcock have been found in greater numbers this season than for ten years past.

Quail have been scarce, due to the extremely cold weather of the past two years. I have seen but five flocks, and three of them were fed and cared for by me through the winter preceding.

Partridge shooting in this section of the State this season was considered the best for five years. Some fine bags were taken out of the covers, and I beg leave to call the attention of the Board to a few of the several remarkable captures which were made in this section during the open season. William Strain of Ware and Thomas F. Horrigan of Brighton bagged 14 partridges and woodcock in seven hours; Mr. Strain himself killed 44 in seven days' hunting. John A. Davis of Ware killed over 70 partridges in two weeks. C. H. Sawyer of Northampton, who is president of the Northampton Rod and Gun Club, reports that two hunters in that city killed 34 birds, partridge and woodcock, in one day. William Cummings of Ware killed 17 birds, partridge and woodcock, in one day's shooting. Such hunting tends to show the increase of birds since last season. With a little protection, the large number of birds left over from the season just closed, if there is a good hatching season, warrant the belief that birds will be found in abundance at the

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opening of the season of 1906. Small game, including rabbits and gray squirrels, have increased wonderfully in this section in the past five years. Song and insectivorous birds are increasing yearly, but pheasants are very scarce in this section.

Trout fishing during the past year has been particularly satisfactory, especially in the central and western sections of the State. Large fish and plenty of them have been taken, which shows that stocking the streams with fry and fingerlings year after year by the commission has not been a waste of time or money. In this connection I beg to call the attention of the Board to a few of several remarkable catches of trout in the town of Ware, Hampshire County. T. F. Horrigan of Brighton, in one day's fishing, took 31 trout from Ware waters, the largest weighing 2 pounds. E. W. Lawton of Ware took 5 trout, weighing 6 pounds. The writer caught 12 trout, weighing 7 pounds dressed, in the Barnes Brook one afternoon. These catches show the grand results obtained by continued re-stocking of the streams.

From several years' experience in field work, and after careful consideration and study of the question, I respectfully submit that there is need of a law which will give the paid deputies a right to detain any suspected person found in the woods hunting or on a trout stream fishing, who refuses to show what he has killed, and bring him to the nearest police station and there search him, without the deputy laying himself liable.

There is also need of a law to limit the hunter's bag to a reasonable number of partridges in one day; and the law should provide that the possession of more than the allowed number at one time would be *prima facie* evidence to convict. For the privilege of hunting in this State non-residents should be made to pay a license fee of $10.

Respectfully, DENNIS F. SHEA,
Deputy.

Purposes of the Game Laws. — It is beyond all reason to expect that in general game laws, however well enforced, can restore in a generation the abuses which have been practised upon game and useful birds since the settlement of the country. In spite of the close-season law and other restrictions, which were first enacted in the colonies in 1709, upon hunting turkeys, heath hens (later named pinnated grouse), ruffed grouse, quail and woodcock, the last wild turkey has long since been killed; the heath hen or pinnated grouse, which formerly inhabited the scrub oak tracks of southern New England and sections of western New York State and southerly to Virginia, have become restricted to a small area in Massachusetts of less than 25 square miles; the woodcock is dangerously near the verge of extinction; the quail and ruffed grouse have decreased alarmingly in numbers, and their range is becoming restricted in all the States.

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The game laws of this country are based upon the principle that the wild fish, birds and mammals are property of the State. This is now a well-recognized principle, and is the basis of any law which State and national legislative bodies may make in exercise of their police power of protection to the property of the State and nation. The principle has been sustained by the highest courts, including the Supreme Court of the United States.

In many cases severe penalties have been imposed for the purpose of definitely calling attention to the importance of properly protecting birds. In New Jersey during 1904 eighteen sentences of imprisonment were imposed. The shortest was ten days for killing a snow bird, and the longest was ninety days for killing two robins. While these laws and the enforcement of them are of direct benefit to farmers and other citizens of rural and suburban districts, the urban dweller also shares the benefits. The cost to farmers of controlling weeds and injurious insects in Massachusetts is annually a very large sum in direct expenditures for labor and for materials necessary to protect the crops. In spite of this expenditure, the annual damage to the growth of crops by insects must be estimated at not less than $4,000,000. All this must be figured in the cost of production, and therefore actually determines the average selling price of practically all agricultural produce. Apples cost in the market 50 cents per barrel more if the grower is compelled to pay 50 cents per tree to kill tent caterpillars, apple maggots and codling moths, because a neighbor, a stranger or a cat kills the cuckoos, the vireos, the night hawks, whip-poor-wills, bluebirds, wrens, etc. The quail or "bob-white," which has been carefully studied by the late S. D. Judd, when assistant of the United States Biological Survey, was estimated to consume annually in Virginia and North Carolina 1,341 tons of weed seeds and 340 tons of insects. The quail feeds directly in our cultivated fields, and the insect food is largely made up of the Colorado potato beetle, cutworms, army worms and similar farm pests; and it is therefore one of our most valuable birds, and one worthy of serious attempts at domestication.

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Obstacles to Enforcement of Game Laws.

SEEK DEER HUNTERS. — SQUAD OF FISH AND GAME WARDENS IN WOODS ABOUT BUZZARDS BAY AND SANDWICH.

Buzzards Bay, Nov. 21, 1905. A squad of fish and game wardens are searching the woods about here and at Sandwich for violators of the game laws. The wardens are watching for persons who they believe are illegally shooting deer. Deer are very plentiful, and many are believed to be from the game preserve on Naushon Island in Vineyard Sound. It is unlawful to kill deer here at any time. All the members of the squad except Warden Mecarta of Harwich are strangers here. Game wardens who have visited this region in the past in quest of violators of the game laws have never been successful. ("Boston Globe.")

Statements like the foregoing are not the least of the difficulties which our deputies are compelled to work against. Through such an item the violators or their "accomplices after the deed" are almost certain to be warned, and the work of the deputies must be repeated.

Another sort of person with whom the deputies have to deal is the type which "wishes to be solid with both parties," — who in one breath furnishes evidence that a State law is being violated, the people's lawful property unlawfully destroyed, and immediately hastens to this professional violator and tells him that the deputies are on his track. As we have said before, a finer public conscience should be trained to meet this problem of the violations and enforcement of the fish and game laws. We can safely promise the citizens that the authority entrusted to this commission shall not be used to persecute the unwitting or ignorant violator of the laws. The boy with a short lobster or a short trout, or the sportsman or recreationist with a trout or two "just a leetle short of the legal size," is not the type of violation with which our deputies concern themselves. They seek the professional violators, the sellers of partridge and woodcock, and the type of "sportsman" (?) who goes for a record, killing every fish or bird, whatever its size or species, because it counts one in the story which he rehearses to himself before he vaingloriously retails it to his admiring (?) listeners.

In enforcing the law our deputies do not seek to secure "a record" of an aggregate sum of convictions or of fines imposed.

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In many cases of a first offence a warning is given in unmistakable terms; on the second offence the law is permitted to take its course. We aim to deal with each individual or condition in such a manner as to teach the people to understand the purpose and the value of the law, rather than by harsh measures arouse opposition or do injustice to an unintentional offender, in a case where milder treatment might have secured equal respect for the law.

The following report from Deputy Burney details some of the obstacles with which our deputies are able to cope successfully: —

Saturday at 2 P.M., Jan. 14, 1905, I received a complaint from Georgetown that a deer had been killed in that town. I started from Lynn on the 3.16 train, arriving at Georgetown about 4.30. I met the chief of police (who was the complainant) at the depot, and after hearing his story I saw we had a pretty good case to work on, and immediately got out a search warrant. Realizing that we could not search a dwelling house under our warrant, we drove to Newbury and saw the meat inspector and told him our story. He said he would try to get a warrant to search for uninspected meat. We then drove to Haverhill and saw the clerk of court, who, after listening to our story, refused us a warrant. We then drove to South Groveland, where the suspected parties lived, arriving there about 11.15 P.M. Going to the house of Mr. B. (who was the suspected party), we found in the bushes the sled upon which the deer had been dragged from the woods. There were blood and hair on the sled, and the hair I *knew* was from a deer. Going back to the house we knocked at the door, and Mr. B., Sr., came to the door. We told him who we were, and that we wanted the deer that had been killed near by and dragged to his house on the sled which we found in the bushes. He denied any knowledge of it, adding that if we thought it was in his house we might come in and search, which offer we availed ourselves of at once. We found nothing on the lower floor, and, as the two women of the house had gone upstairs (as we supposed, to retire), we did not search the upper part of the house. We then went outside and looked over the woodshed. We knocked off a bulkhead door to the cellar of the shed, when I crawled under on my hands and knees. That part of the shed was filled with stove wood, and I found no sign of deer meat. I also looked all around the building, and found no signs there. Next we took the back track of the sled into the woods, thinking they might have hung the deer up somewhere in the thick woods, where it would not be seen. We went back more than a mile on that track and found only one sled track, showing that the sled had been carried on some one's back while going from the house. We found also several places where the deer had fallen off the sled, and the snow all trodden down and bloody. Coming back to the house, we went all around the clearing near the house, but found

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nothing. When we got to the house the man who was with me went into the house to get warm. I took the lantern then for another look around. Going by one of the windows in the rear of the house I found some blood marks on the snow. Looking further, I found a small piece of deer meat and blood marks leading to the woodshed door, which had been nailed up again. *I knew those marks were not there when we first looked around there.* Going into the house after the axe to rip off the door, Mr. B. asked me, "What do you want it for?" I told him I had enough evidence to lock him up, and if he did not show me where that meat was, I would do so at once. Then I told him I was going to open that door again. He came out with me, and when he saw me start to break the door off he said the meat was in there, and had been there all the time, — which was a lie, as two of us looked that place all over. When I got the door off I found the meat, and it was wrapped up in a sheet, — convincing proof that the meat was upstairs in one of the bedrooms, and, while two of us were out in the woods looking for it, it was thrown out of the window by Mrs. B. and put into the woodshed (where we had searched before) by Mr. B., as the chief of police, who had been left in the house, said he went out while we were in the woods.

B. said he intended to burn it, as he knew it was wrong to kill a deer in Massachusetts; but he said *he did not kill it.* I told him it made no difference, as I was going to lock him up. Just as I finished my statement, young Mr. B. spoke up and said *he* killed the deer. As he and his father said he would be at court at Haverhill the following Monday, I did not arrest him. He appeared at the time stated, was convicted, and fined one hundred dollars. Failing to pay, he was committed to the House of Correction for two months.

As to the elder B.'s statement of his intention to burn the meat, I found where he had purchased two empty butter firkins and a peck of coarse-fine salt. Of course he intended to burn that with the deer!

On this trip we were out from 4.30 P.M. Saturday to 4.30 A.M. Sunday, and it was the coldest night of the season. The thermometer registered 14 degrees below zero Sunday morning, when we got back to Georgetown.

Deer. — Wellesley, Nov. 28, 1905. On the estate of Charles B. Dana, off Grove Street, in the outskirts of this town, a full grown deer was seen grazing about the frost-nipped fields this afternoon. The deer had a magnificent set of antlers. The animal appeared well fed, and had evidently found browsing in this vicinity profitable. The deer wandered contentedly about the field for half an hour, when he became frightened and made off into the Ridge Hill woods. Earlier in the afternoon a small doe was seen on the Cartwright estate, off from the Dana fields. The doe wandered about the fields and underbrush for some time, nibbling at the twigs and nosing about the underbrush. When boys gave chase to the doe it made into the Ridge Hill woods near the same place where the larger animal went soon afterwards. It is believed here that the two animals wandered down into the wooded sections of this town from Maine or New Hampshire woods, as two such animals are not known to be missing from any parks anywhere in

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this vicinity. Residents of Cartwright Street report that the larger animal, or one closely resembling it, was seen browsing about the fields in the Dana place one afternoon about a fortnight ago.

The above paragraph fairly represents the general idea that deer are uncommon animals in Massachusetts, and when they appear are to be regarded as stray animals. Ten years ago deer were indeed rare, but under the present law, which forbids the hunting, chasing, wounding or injuring of a deer, or possession of a deer killed in Massachusetts, they have multiplied with amazing rapidity. They are reported from all sections of the State, though naturally they are most numerous in the western half of the State. An estimate based upon reports sent into the office by our deputies places the total number of wild deer in the State at upwards of 5,000.

The public should be duly warned that it is contrary to law to chase a deer; and it has proved to be a costly experience for three young men in Lynn, who chased a deer which had wandered into the city and become confused.

Considerable numbers of deer are killed by locomotives, trolley cars, etc., by being chased by dogs, and by hunters.

The most notable seizure of game ever made in this State was the carload of game which was shipped from Maine as "household furniture." On its arrival in Boston it was seized by this commission. The owners did not care to claim it, and the entire lot, consisting of 12 deer, weighing 1,525 pounds, 4 hind saddles of deer, weighing 240 pounds, 2 hindquarters of moose, and 6 bags containing 165 ruffed grouse, was disposed of in accordance with the decree of the court.

Killing of Birds for Millinery Purposes. — Early in the year it came to the notice of the commissioners that large numbers of birds which are very properly protected by law in this Commonwealth and in other States were being sold for millinery purposes. In Taunton, Fall River and New Bedford even an incomplete investigation disclosed upwards of 2,000 wild birds or parts thereof which had been prepared and placed on sale for millinery purposes. The following notice was then sent to the prominent wholesale and retail milliners of Massachusetts: —

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DEPARTMENT OF FISHERIES AND GAME, BOSTON, MASS.

I beg to call your attention to our State laws covering the possession or wearing, for the purpose of dress or ornament, the body or feathers of insectivorous and wild birds, whether taken in this Commonwealth or elsewhere. This law covers the skins and feathers or parts thereof especially of insectivorous birds, herons (aigrettes), gulls, terns, shore birds, etc., "whenever and wherever taken." We respectfully suggest that you can best observe the spirit and letter of the law by removing from sale all such feathers, and returning them to the wholesalers; and, further, by refusing to buy or sell such feathers, aigrettes, etc. Certain dealers are claiming that the bird laws are not to be enforced, or that their particular goods, notably aigrettes, are manufactured, and therefore not prohibited by this law. In case such statements are made, the writer will be glad to give an opinion as to whether any particular feathers come within the scope of the law, and whether such are liable to seizure and the possessor liable to arrest.

The State authorities entrusted with the protection of bird life wish to secure results with the least possible hardship to the public and the "trade," and therefore ask your co-operation.

In any event, however, we beg to formally notify you that we shall use every legitimate means to enforce the laws of the Commonwealth, and all persons having such birds and feathers in possession, whether as dealers or wearers, are liable to arrest.

Respectfully yours, G. W. FIELD,
Chairman.

A special deputy has during the year visited the millinery stores throughout the State, and secured definite promises from the owners and managers to abstain from the display and sale of such feathers. In general the most cordial good-will and respect for the law, as well as a strong appreciation of the motives and necessity, together with a good knowledge of the scope of the law for the protection of birds, were reported. Thus far it has been necessary for our deputies to confiscate but two lots of such illegal feathers. Many lots have been returned to the wholesalers; a larger number have been burned or otherwise destroyed by the owners. A very considerable quantity have been "put away" by millinery houses to await the time when "the excitement blows over." Inasmuch as sufficient time has been given to permit those who were unwittingly violating the feather law to dispose of such illegal possessions, our deputies have been instructed to watch carefully for all violations, and if necessary proceed with the confiscations and prosecutions.

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Additional facts concerning the magnitude of the crimes committed by feather hunters can be gathered from the following extracts from "Bird Lore," January-February, 1905: —

Midway Island at the time of my visit in 1902 was covered with great heaps of albatross carcasses, which a crew of poachers had left to rot on the ground after the quill feathers had been pulled out of each bird. This mischief was done notwithstanding the fact that the previous year a similar party had been warned off by the United States steamer "Iroquois," which visited the island by chance.

Honolulu, June 23. Captain Hamlet of the "Thetis" states that the destruction wrought to bird life by the party of Japanese poachers on Lisiansky Island was something appalling. He estimates that they killed at least 300,000 birds, to judge from the number of cases of plumage and the amount of meat they secured. All of their spoil had to be abandoned, but it is properly preserved, and will keep for a long time. There are 335 of these cases, the plumage in them being of the highest quality.

Early during the present year large numbers of swallow skins were offered in the millinery shops in New York. On examination they were found to be Hirundo rustica, a common European bird. Some were purchased and sent to the British society, in order to keep them informed of the situation in the United States. The secretary replied: "Your enclosure is of melancholy interest, — the poor little bodies of these young swallows, killed when just out of babyhood, and making, probably, their first flight to a new and unknown home, — swallows that ought to have come and twittered about our English homes, but instead are ghastly little corpses for the 'decoration' of American women's hats.

"I think I may say that in England the swallows are everywhere protected and valued. I doubt whether one is ever intentionally killed. On the contrary, the decrease in their numbers has of recent years been a subject of serious concern. It is on the Mediterranean, in France and Italy, that the slaughter of these birds takes place during the migration season; and this I fear we shall have no power to stop until some international law of bird protection is agreed upon."

Sunday Hunting. — In rare instances a judge may hold that no intent to violate this law is shown when a man is on the hunting grounds with a loaded gun; but except in isolated instances, such presence on the hunting grounds with a loaded gun, even if it is not discharged at birds or game, is sufficient for conviction. Sunday hunting is still prevalent in those sections which are as yet insufficiently patrolled, owing to the small number of paid deputies.

Smelt Seining. — During the smelt season, particularly during the spawning period, particular attention and much time

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is devoted to the protection of smelts. We receive many complaints of seining, but they are usually found to be ill-founded. This sort of detective work is very trying and dangerous to the health of a person, for the seining is done at night, and one must lie among the bushes or trees on the bank of a brook, or among the rocks on the shore, for several nights, waiting for these violators to come with their seine or net. Without the seine or net we are unable to get a conviction, though we produce the smelts in court without a hook mark on them. There are several hundred fishermen who go about at night seining or torching herring and whiting; these men get some smelts; they seldom return them to the water, for they use a dip net, and must work quickly while the fish school under the light which projects from the bow of the boat. When they finish dipping, the smelts are dead, and it would be useless to return them to the water. Some provision should be made to regulate this industry, as it is very profitable, and increasing yearly. This has been an unusually good smelt season.

Work of the "Scoter." — The launch "Scoter," under the able and honest management of deputies Killion and Serrilla, has continued to do efficient work in preventing the killing of short lobsters. In addition, they have done much to protect the fishermen from thieves who illegally haul lobster pots, and to check Sunday shooting.

To the Commissioners on Fisheries and Game, State House, Boston, Mass.

DEAR SIR: — I herewith submit my report for the year ending Nov. 20, 1905: —

During the winter and early spring much of my time is spent at the dealers in and about Boston, inspecting Nova Scotia lobsters, to see that no short lobsters are saved with the large, as the fishermen sometimes put in short ones, thinking they will escape the attention of the deputies. There are several dealers here who write weekly to their fishermen not to "mix the shorts," and these dealers render all possible assistance to stop the short lobster traffic. There were fewer shorts this year than last. I inspected about 6,500 crates of lobsters, and found about 8,000 shorts, which were put into Boston harbor. There are also shipped through this port to New York, Rhode Island and other States many crates of short lobsters, which, were the deputies not on hand, would remain here in Boston and be sold as meat. Also during this season I kept careful watch of the markets in and about Boston, to see that the law was not violated.

We put the launch "Scoter" in commission in April, and during the

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native lobster season we patrol the harbor and coast in the vicinity of Boston, protecting the lobsters.

That our previous seasons were a success is shown by the reports of the honest fishermen in and about Boston. It is impossible to give the exact figures on how many shorts are returned by the fishermen, because of the "Scoter" being on the fishing grounds while they hauled their traps, but we can give an estimate. On April 26, while on the fishing grounds, we counted 1,500 shorts returned by fishermen, one man throwing overboard a bag of shorts. During the month we estimate 57,000 shorts were returned by the fishermen. During May the catch of large lobsters was very good, and some of the fishermen report the best spring for ten years.

We searched many boats, and liberated several hundred shorts in sunken traps, which latter we confiscated; in one haul we got 850 shorts. The estimate of May is 60,000 shorts returned. June was a very good month; estimate 90,000. In July we searched many boats in and about the harbor; we hauled a great many sunken pots, and got over 3,000 shorts.

On July 5 we counted the shorts which 2 fishermen returned while they hauled, and the average was 4 to a pot. In that vicinity there were 15 fishermen, and each had about 100 pots there, which would show that they returned, on that day, 6,000 shorts in that part of the harbor. There are about 150 fishermen in and about Boston harbor, and it is safe to estimate that on that day in all the harbor we caused, by our presence among the fishermen, more than 20,000 shorts to be returned.

During July we estimated 175,000 shorts returned. August was a fairly good month for the fishermen. We got 1,500 shorts in blind traps, and estimate 140,000 shorts returned.

September was a very good month for lobsters, but many pots were lost by the storms. During the month we estimate 140,000 shorts returned.

The fishing during October and up to November 20 was very good, and the shorts were as plentiful as during the summer; we estimate 147,000 returned. After this month many of the fishermen take in their traps.

During November there was a great plenty of shorts outside Boston Light, but very few of the fishermen care to go there, as it is very rough, and small boats are not safe. We can say that by our presence on the fishing grounds and about the harbor and vicinity 900,000 short lobsters were returned by the fishermen, which otherwise would have been destroyed and sold for meat. Surely some of these lobsters were caught over and over again; but if the deputies were not there, or were not expected by the pirate fishermen, the lobsters on Massachusetts coast would soon be wiped out. For this reason all honest fishermen are in favor of having more boats to patrol the coast from New Hampshire to Rhode Island.

On one part of the coast the fishermen have adopted a very good method of stopping the saving of short lobsters. If a fisherman is seen saving any shorts, some of the other fishermen cut the buoys from

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his traps, and he soon learns that it is cheaper to stop saving shorts than it is to buy traps. This is a very good custom, but there are several ways which if applied would save this best of all crustaceans.

Four boats patrolling the coast would, I believe, be the best way possible, — one to patrol from New Hampshire line to Lynn, one from Lynn to Scituate, one from Scituate down the South Shore, and the other at Buzzards Bay.

This not only would save the lobsters, but would protect all fish and stop all Sunday hunting along the coast. The passage of a meat law and license law would be an excellent way of putting a stop to this unlawful practice.

Under the present law, the fisherman who is caught goes to court, and after the case is disposed of goes out to save more shorts to pay for the fine imposed, whereas, if he knew he was liable to be sent to jail for a period of one month or more, he would not care to take the chance of getting caught by saving any more lobsters.

Therefore, I would suggest that a penalty of imprisonment be added to the law now in force, from one month to a year for having in possession short lobsters. A fisherman who is caught with more than a hundred shorts is dealt with more leniently than the man with a dozen or less, though he is the greater violator. A man with 10 lobsters is fined $2, $3 or $5 apiece; the man with 75 or more is fined $1 or less apiece. Now, if the court had the right to send a man to jail, the man with the 75 lobsters might be fined $5 apiece, and if he wouldn't pay, the court under the proposed amendment to the law could sentence the offender to jail.

It is during the summer season, when the shore hotels and restaurants are open, that the short lobster is used on this coast. These lobsters are supplied by men who have fast naphtha boats, and who purchase the shorts from the fishermen at 4 cents apiece. They usually work at night and we are unable with one boat to chase up and down the coast after these men. While we are at the South Shore these men are on the North Shore; and if we neglect the harbor at Boston for any length of time, the fishermen there save the shorts and dispose of them to pleasure parties on yachts and boats.

We have been able to make these dealers in short lobsters throw overboard the lobsters which they had, but have never been able to catch them, as they can see the "Scoter" coming, and before we get to them the lobsters are gone; we search the boat, and find no short lobsters.

I have been sent to different parts of the State in discharge of my duty, and hear very good reports of game and fish. We also are active while about the harbor endeavoring to put a stop to Sunday hunting and shooting from power boats. This year the wild fowl and shore birds were very plentiful, and I learn from very good authority that it was the best season for many years. I never saw so many of the duck species as this year, and this fact only adds to the temptation of Sunday hunting and hunting from power boats.

Very respectfully yours, DANIEL J. KILLION,

Deputy, in charge of launch "Scoter."

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New Legislation.

We especially recommend the following changes in the fish and game laws: —

The amendment of section 84 of chapter 91 of the Revised Laws, by the addition of the following words: *for the purposes of this section a seed scallop shall be defined as a scallop which has never laid eggs, or a scallop which was hatched from an egg laid during the summer previous to time of taking,* so as to read as follows: —

Whoever takes seed scallops from the flats or waters of the Commonwealth shall be punished by a fine of not less than twenty nor more than fifty dollars for each offence; but such penalty shall not be incurred by any person taking such scallops who returns them alive to the flats or waters from which they were taken. For the purposes of this section a seed scallop shall be defined as a scallop which has never laid eggs, or a scallop which was hatched from an egg laid during the summer previous to time of taking.

Measurements of upwards of 35,000 seed and adult scallops in Chatham, Edgartown and Nantucket indicated that a size limit of 2 inches in diameter measured on a straight line drawn from the outside edge of the scallop perpendicular to the middle point of the outside line of the hinge would be the most satisfactory definition of a seed scallop.

More satisfactory provision should be made for legitimately securing shiners for use as bait. The following is therefore recommended: —

It shall be lawful to take shiners for bait in any of the waters of the Commonwealth by means of a circular or hoop net of a diameter of not exceeding six feet or by means of a rectangular net other than a seine containing not over thirty-six square feet of net surface.

The provisions of section twenty-six of chapter ninety-one of the Revised Laws, as amended by acts of nineteen hundred and four, chapter three hundred and eight, and of section one hundred thirty-two of said chapter ninety-one, shall not apply to a person taking fish other than shiners by means of the apparatus described in section one, provided that the said fish other than shiners are immediately returned alive to the water.

This act shall take effect upon its passage.

On account of the barbarous destruction of certain fish during the breeding period, we urge the passage of an act to

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prevent the destruction of pike perch during the spawning season: —

SECTION 1. No person shall kill within this commonwealth, between the first day of February and the first day of June in any year, any fish known as pike-perch; and no company, firm or person shall transport into or within this commonwealth any of the said fish caught between the said dates, wherever the same were caught.

SECTION 2. The commissioners on fisheries and game and their deputies are hereby authorized to seize and confiscate fish killed or transported in violation of the preceding section, and it shall be the duty of every officer designated in section four of chapter ninety-one of the Revised Laws to seize fish so killed or transported, and to report the seizure to the said commissioners, who shall authorize the sale of such fish; and the proceeds of any such sale, after paying the expenses of the sale, shall be paid into the treasury of the commonwealth.

SECTION 3. Any company, firm or person violating the provisions of this act shall be liable to a penalty of fifty dollars, and of ten dollars additional for each fish killed or transported in violation of the provisions of this act.

SECTION 4. This act shall take effect upon its passage.

For the purpose of safeguarding the public health, and for restricting the extensive evasion of the present lobster laws, we recommend the enactment of a law prohibiting the sale of lobster meat after removal from the shell, as follows: —

All lobsters or parts of lobsters sold for use in this state or for export therefrom, must be sold and delivered in the shell, under a penalty of twenty dollars for each offence; and whoever ships, buys, sells, gives away or exposes for sale lobster meat after the same shall have been taken from the shell shall be liable to a penalty of one dollar for each pound of meat so bought, sold, exposed for sale, given away or shipped. Any person or corporation in the business of a common carrier of merchandise who shall knowingly carry or transport from place to place lobster meat after the same shall have been taken from the shell shall be liable to a penalty of fifty dollars upon each conviction thereof. All lobster meat so illegally bought, shipped, sold, given away, exposed for sale or transported shall be liable for seizure, and may be confiscated. Nothing contained herein shall be held to prohibit the sale of lobsters that are legally canned.

The above is practically a verbatim copy of the law in force in Maine. It has proved to be very satisfactory to all concerned. It works no inconvenience to the consumers of lobster salads, but compels the managers of hotels and summer resorts

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to buy the lobsters in the shell, whereby some assurance may be obtained that the lobster had not died previous to boiling, and that the meat had not been unduly exposed to infection.

In view of the evidence that the present laws governing the lobster industry have proved inadequate to fulfill the purpose desired, we recommend a careful consideration and trial for a sufficient term of years of some practicable method of protecting the adult lobsters, in order that the number of breeding lobsters in the ocean may be increased.

An act suitable to check the enormous destruction of wild birds, both game and insect-eating, by cats, is urgently needed.

For the purpose of preventing the total extinction of one of the most interesting native birds, we urgently recommend a close season for at least five years upon pinnated grouse, with a fine of at least one hundred dollars, as follows: —

Whoever hunts, takes, kills or has at any time in his possession, or buys or sells or otherwise disposes of a pinnated grouse, or heath hen, so-called, scientifically known as *Tympanuchus cupido*, or any part thereof, previous to November one, nineteen hundred and eleven, shall be punished by a fine of one hundred dollars for each bird or part thereof.

Section four, chapter ninety-two of the Revised Laws, is hereby amended by the omission of the words "a pinnated grouse at any time or" in the first line.

This act shall take effect upon its passage.

Also the prohibition of the sale of prairie chickens and of quail (*Colinus virginianus*), or any part thereof, whenever or wherever taken, except for purposes of propagation, as provided in section 3, chapter 92 of the Revised Laws.

The snaring of ruffed grouse should be totally prohibited.

The wood or summer duck should be placed upon the list of birds which may not be killed at any time.

The commissioners urgently recommend consideration of the benefits accruing to all from having open seasons for game uniform throughout the State, both as to localities and as to the different species of game birds and animals.

In regard to the shooting of pheasants the following is recommended, giving an open season on male pheasants during the open season for quail: —

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It shall be unlawful to take, kill, sell or have in possession except for purposes of propagation, a male Mongolian, ring-neck or English pheasant between the first day of December and the first day of November following, or to take, kill, sell or have in possession except for the purpose of propagation, a female bird of the said varieties at any time, under a penalty of not more than twenty dollars for each bird or part thereof. Possession of a dead pheasant during the time when the taking or killing is prohibited shall be prima facie evidence that the person having possession has violated some of the provisions of this chapter.

We earnestly urge the abolition of spring shooting, in the belief that such action will result in the nesting within the State of an increased number of migratory birds. The experience of other States indicates a large increase in the number of migratory shore and marsh birds, ducks, etc., which remain to breed in States where spring shooting is no longer practised.

A shortening of the season on hares, rabbits and squirrels, for the well-known reason that many quail and ruffed and pinnated grouse are illegally shot by "rabbit hunters."

We recommend that section 5 of chapter 92 of the Revised Laws, as amended by the Acts of the year 1905, chapter 414, be further amended by the omission of the following words at the end of the section: *but the provisions of this section shall not apply to the great American herring gull, nor to the great black-backed gull between the first day of November and the first day of May following.*

The enactment of a law for the further protection of wild birds and mammals, by giving additional powers to the commissioners and their deputies: —

A commissioner on fisheries and game, or any duly authorized deputy thereof, may demand of any person who is, in the opinion of such commissioner or deputy, engaged in the taking, killing, hunting, trapping or snaring of fish, birds or mammals contrary to law, that such person shall forthwith display for the inspection of such commissioner or deputy any and all fish, birds or animals then in his possession; and the refusal to comply with such demand shall be prima facie evidence that the person so refusing is engaged in the taking, killing, hunting, trapping or snaring of fish, birds or animals in violation of law. The said commissioners and their deputies may call upon any person or persons in the name of the commonwealth to assist them in the execution of their duty in the enforcement of the fish and game laws; and whoever, being so required, neglects or refuses such assistance shall be punished by imprisonment for not more than one month or by a fine of not more than fifty dollars.

This act shall take effect upon its passage.

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In this connection it may not be out of place to note that the following States grant their deputies or wardens right to search with and without a warrant: Maine, Connecticut, Vermont, Washington, Illinois, Pennsylvania, Iowa, Colorado and Michigan; while other States, *e.g.,* New York and New Jersey, give specific permission to search game bags, coats and fish baskets.

The enactment of a law relating to ferrets: —

Owners or possessors of ferrets shall notify in writing the commissioners on fisheries and game of the fact that one or more ferrets are in possession. The owners or possessors of such ferret shall, under a penalty of ten dollars, also notify in writing the commissioners on the day that a ferret or ferrets leave the possession of the former owner or possessor, and shall at the same time give the name of the owner or possessor into whose possession the ferret passes. Ferrets which are not thus accounted for are liable to confiscation, and the possessor liable to a fine of not exceeding ten dollars for each ferret in his possession.

Courtesies.

It is our privilege and pleasure to acknowledge the courtesies extended to the commission by Mr. Arthur L. Millett, local agent of the United States Bureau of Fisheries at Gloucester, and by F. F. Dimick, secretary of the Boston Fish Bureau. Also by E. C. Watson, Esq., who so cordially extended to the chairman and to Commissioner Delano the privilege of the City Club of St. Johns, N. F., on the occasion of their visit to that city in October, 1905.

The officials of the Massachusetts Fish and Game Protective Association, particularly Messrs. C. W. Dimick and H. H. Kimball, have very kindly furnished us with opportunities to secure live quail for experiments in propagation.

In the complete absence of laboratory facilities, our biologist, Mr. Belding, was permitted during the winter months to make use of the equipment in the biological laboratories of the Massachusetts Institute of Technology, through the courtesy of Dr. W. T. Sedgwick, professor of biology. Professor Sedgwick, in a characteristic note, says: "The Institute is always happy to do anything it can for the State, as some slight return for the many things which the State has done and is doing for the Institute."

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Permits to hold in confinement egg-bearing lobsters for collection by agents of this commission, according to chapter 408, Acts of 1904, were issued to 220 fishermen.

Permits for taking birds and eggs, under various restrictions and for scientific purposes only, under section 7, chapter 92 of the Revised Laws, as amended by chapter 287, Acts of 1903, were issued to the following persons: —

John H. Hardy, Jr., Boston.
Frank S. Aiken, Fall River.
Frederick E. Waterman, Fall River.
Chester A. Reed, Worcester.
Ulysse Buehler, Stockbridge.
Robert O. Morris, Springfield.
Fred H. Kennard, Brookline.
John W. Bailey, Boston.
George H. Avery, Easthampton.
Alfred E. Preble, Wilmington.
A. C. Bent, Taunton.
Owen Durfee, Fall River.
Rufus Choate Currier, Newburyport.
E. H. Forbush, Boston.
Napoleon Letiecq, Worcester.
Dr. A. H. Tuttle, Cambridge.
S. A. Capron, Medford.
Homer L. Bigelow, Boston.
Haynes H. Chilson, Northampton.

During the past year permits were issued to the persons named below to hold in confinement quail for purposes of propagation, in accordance with section 3, chapter 92 of the Revised Laws, as amended by Acts of 1905, chapter 406: —

Gen. Adelbert Ames, Tewksbury.
Edmond L. Sinnott, Bridgewater.
Eugene D. Whiting, Bridgewater.
G. M. D. Gardinier, Wellfleet.

Permits for taking sand eels for bait, according to chapter 164, Acts of 1902, were issued to the following persons: —

Robert J. Sweeney, Salisbury.
John F. Sweeney, Salisbury.
Paul Jones Lowell, Newburyport.
Joseph Thurlow, Newburyport.
William H. Simmons, Newburyport.
Richard E. Pierce, Newburyport.
Samuel P. Dow, Newburyport.
E. L. Perkins, Newburyport.
Charles F. Lattime, Newburyport.
Albion P. Hilton, Newburyport.
C. A. Leet, Ipswich.
S. W. Caswell, Ipswich.
H. T. Mackinney, Ipswich.
Edward E. Wells, Ipswich.
James E. Carter, Ipswich.
William Crooks, Newburyport.
Charles A. Lunt, Rowley.
James Crooks, Newburyport.

Permits were issued during the year to the persons named below to take and hold in confinement egg-bearing lobsters for fish-cultural purposes: —

E. F. Locke, United States Fisheries Station, Woods Hole.
C. G. Corliss, United States Fisheries Station, Gloucester.

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Permit to operate one pound net in the waters of Buzzards Bay was issued to: —

E. F. Locke, United States Fisheries Station, Woods Hole.

Permits to take lamprey eels for scientific purposes were issued to the following: —

William N. Holmes, Lawrence.
George M. Gray, Woods Hole (Marine Biological Laboratory).
A. J. Carlson, Chicago (University of Chicago).

Respectfully submitted,

GEORGE W. FIELD.
EDWARD A. BRACKETT.
JOHN W. DELANO.

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REPORT OF THE COMMISSIONERS ON FISHERIES AND GAME

UPON THE

DAMAGE CAUSED TO THE FISHERIES OF MASSACHUSETTS BY DOGFISH

During the Year 1905.

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REPORT

UPON THE

DAMAGE DONE BY DOGFISH TO THE FISHERIES OF MASSACHUSETTS.

To His Excellency the Governor and the Honorable Council.

Sir: — In accordance with chapter 12, Resolves of 1905, the Commissioners on Fisheries and Game respectfully submit the following report upon the damage done by dogfish to the fishing interests of Massachusetts.

The aim of the present investigation has been to arrive at accurate and judicial statements of actual, definite damage caused directly by dogfish. We have endeavored to take a wider range of view than that of the men whose property is almost daily destroyed, and whose hard-earned income is curtailed, by the ravages of the dogfish. Only passing references are here made to the serious indirect damage, such, for example, as the effect of dogfish in driving schools of bait fishes from our shores, and thus through the scarcity of fresh bait causing loss of time to the fishing vessels and crews. In a similar way there is some evidence that dogfish drive out of our bays and from our shores into deep water schools of herring, mackerel and other valuable fish, and thus may seriously affect our fishing interests. Of the verity of such conditions, however, there exists a very strong probability, yet it is not susceptible of actual and absolutely satisfactory proof.

Scope of the Report.

Your commissioners have, by personal observations and through the observations of specially appointed, accurate and trustworthy agents, secured a large quantity of reliable, first-

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hand definite information and statistics upon the damage done by dogfish to fishing apparatus, such as nets, seines, trawls, hand lines, etc., to bait, and to fish caught on trawls or in nets; of "broken trips," due to the excessive number of dogfish on the fishing grounds; and, finally, have made examinations of the stomachs of dogfish, to determine the kind and quantity of food, hoping thereby to secure information upon the quantity of valuable food fishes destroyed by these sea wolves.

We have referred to some facts upon the economic value of the dogfish as a source of food, oil, fertilizer, "sand paper" and leather, for the purpose of stimulating the use of dogfish for commercial purposes, and thus in the largest possible measure checking the very serious economic mistake of killing many other species of fish and permitting the dogfish to escape. The fishermen are accustomed to release in the quickest way possible the dogfish which have been caught by hook or net. Only a comparatively small percentage is killed. It is a common source of amusement to fishermen to slash the body of the female dogfish, for the purpose of letting the unborn young escape into the water, "to see them swim." The tendency is to diminish the other species of fish by relentless killing of old and young, and to make no efforts to diminish the number of dogfish; consequently, the number of dogfish in proportion to the number of marketable fish is constantly increasing. Unless some definite and effective means are taken to kill every dogfish which is hooked or netted, the evil is bound to increase.

The question is a broad one, and passes beyond the limits of State or nation. The dogfish plague is now upon the fisheries of both sides of the North Atlantic, very seriously involving, in addition to the fisheries of Massachusetts and of the other New England and Middle Atlantic States, those of the Maritime Provinces of Canada, of Newfoundland, of Great Britain and Ireland, and of the other countries which fish in the North Atlantic Ocean, and the North Sea and its bays.

It is properly a subject for national consideration, for the reason that it is the general public — including the consumers, as well as the fishermen, dealers and distributers — which ultimately receives the benefit of the food fisheries; and it is this entire general public which suffers from any conditions which

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tend to diminish the proper and normal yield of the fisheries, and to enhance the price of fish in the markets of the interior cities and towns, where marine fish, either fresh or salted, cured or otherwise prepared, are bought.

It has come to be a matter of common knowledge that the activities of civilized man have in many cases seriously disturbed the biological equilibrium. For example, by killing the hawks and owls, we have permitted the undue increase of the English sparrow; by killing our insectivorous birds, we have increased the burdens of taxation resulting from insect ravages, *e.g.,* the gypsy and brown-tail moth in Massachusetts, the grasshopper in the west, and the cotton boll weevil in the southern States. In a similar way we appear to have disturbed the equilibrium of the marine fishes. The people of the United States have drawn millions of wealth from the sea. There should be willingness to devote a small proportion of this to provide for a satisfactory maintenance of this source of wealth. The total catch of marine food fish in the New England States and Maritime Provinces was valued, in the hands of the fishermen, at upwards of $20,000,000.

Habits and Life History.

The dogfish is too well known to necessitate a detailed description here. This name is a colloquial one, given to many species in different countries which may have no relationship to one another.

This report concerns only, and the term dogfish is here applied to, the two species of the shark family known as the "smooth dog" and the "spiny dog." The smooth dogfish (*Galeus canis,* Bonap., or *Mustelus canis*), which is common along the shores south of Cape Cod, is particularly destructive to small lobsters and other crustacea, and to some extent to shellfish. But the damage and annoyance from this species is very slight when compared with that from the spiny dog (*Squalus acanthias,* or *Acanthias vulgaris*), often called "picked dogfish" and "spiked dogfish," or "bone dog," on account of the characteristic sharp, stout spine or spike in front of each dorsal fin. The general aspect is that of a typical shark. The skin on the back and sides is an almost uniform slate color, ranging

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to a brownish ash, with indefinite whitish spots, which gradually disappear as the fish grows older; the color of the under surface is a dirty white. A full-grown spiny dog weighs from 5 to 8 pounds, and is sometimes 5 feet long. The females are generally larger than the males of the same age. From their voracious and predaceous nature, and their habit of hunting in schools or packs, they are directly comparable to packs of wolves. They are notorious wanderers, and follow the schools of herring, shad, mackerel and other fish which come northward in the spring. They follow such schools into Canadian waters, but are checked by the proximity of ice; for the dogfish are naturally warm-water fish, and are most at home in or near the waters of the Gulf Stream, on the west and east sides of the Atlantic. Since they are such wide roamers, they rarely remain long in any one locality, though during the past ten years they have rarely been absent from some part of our coast, and the general testimony is that their stay upon these coasts has become prolonged to practically the entire summer. Professor Prince in this connection says: —

Like all the shark tribe, as already pointed out, the dogfishes are essentially wandering in their habits. They roam about in the most puzzling way. Here one day, gone the next; ever restless, and hastening from one area to another, stimulated by the wolf's love of "hunting," and driven no doubt by a voracious appetite to seek new supplies of food. They have been known to infest an extensive portion of coast for a few hours only, and then move on. In the Bay of Fundy the schools have usually made their appearance in the last season or two on or about July 18, and the coast was never free from them for six or eight weeks. In some places their sojourn was abnormally long, and off the Cape Breton shores they were never really absent for the long period of five months during the present year [1903].

A grain of comfort can be gathered from the fact that no one can foretell the date of the departure of these detested enemies to our fisheries. They come suddenly, and they depart suddenly. The causes can be surmised, but to most people they are a mystery. Their erratic appearance and disappearance has been noticed in various countries. It was well brought out in some of the evidence given before H. M. Trawling Commission, 1884, especially in that of Mr. J. Murray of Stonehaven, Scotland, who said, in the course of his remarks: "Of all fluctuations in the abundance or scarcity of any kind of sea fish on this coast, that of the common sea dog, or, as it is sometimes called, the English shark, is the most remarkable. About twenty or twenty-five years ago these fish resorted in enormous numbers to the east coast of Scotland. And yet, although the numbers of these fish had not been

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reduced by either line, net or trawl fishing, still, they have almost completely disappeared from this coast, and no good reason has ever been assigned for their disappearance. If these dogfish had been of the same commercial importance as cod, ling, haddock, etc., their disappearance would have been a serious calamity to the fishing industry, whereas their continued absence is of the utmost advantage to the fisheries. That the sea abounds with life and living creatures is generally well understood; but the conditions of subsistence in the sea are frequently overlooked, viz., that all the larger fish exist by preying upon fish spawn and on their smaller neighbors, without much regard to species or variety. Fish are generally of cannibal habits, and by this seemingly wasteful arrangement of a natural law the prolific fecundity of sea fish is kept in due check, and the balance of ocean life is thereby maintained and perpetuated."

In my report [1898] on the "Fluctuations in the Abundance of Fish," I referred to the increased numbers of dogfish which between 1883 and 1893 frequented the Grand Manan and Passamaquoddy waters. I pointed out [p. 13]: "An increase in the number of sharks and dogfishes in a particular area may have the most baneful results, entailing not merely the wholesale slaughter of valuable fish, but their dispersion and flight to other areas, and frequently extensive injury to the nets and other fishing gear. Over thirty years ago, while mackerel were schooling in vast numbers in Massachusetts Bay, great schools of bluefish, 16 to 20 pounds weight, suddenly made an incursion, and devoured in quantity the smaller fish. The bluefish had been scarce for many years, and their unexpected advent had a most disastrous effect upon the mackerel fishery. Possibly a scarcity of food elsewhere had caused these larger fish to forage in this way."

The splendid fishing grounds off Grand Manan, N. B., deteriorated some years ago on account of the inroads made by sharks, dogfish, etc.; and in an official report [1893] the matter is stated as follows: "The decrease in the cod catch has been gradual for the last ten years, which can only be attributed to the marvellous increase in the schools of dogfish and sharks in the Bay of Fundy. The herring fishery is one-third less than last year, not from a scarcity of herring, but from the manner in which they have been harrassed by the dogfish, pollock and silver hake."

There are records that in 1729, and again in 1756, more than a quarter of a century later, the Welsh shores of Carnarvon and Anglesea were infested by great schools of the huge basking shark. For several seasons, about the two periods mentioned, they abounded in the warm mid-summer months, and about the month of October they disappeared. Pennant, the naturalist, writing in 1769, says that they had at that time entirely quitted the coast, — at any rate, scarcely more than a single one appeared along the coast referred to. Can it be that these schools had wandered from their accustomed grounds off the northwest coast of Ireland? In 1766 vast numbers of dogfish appeared along the east coast of England, but they remained outside the usual fishing limits of small boats, and interfered little with the in-shore operations. In December, when the haddock fishery was at its height, the fishermen secured large takes of haddock, small cobles taking two tons a day;

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but outside the 3-mile limit nothing could be caught but dogfish, with which the outer waters were alive. (Special reports by Prof. E. E. Prince, F.R.S., Canada, "The Dogfish Plague in Canada," 1903.)

Food.

In the preparation of this report we have examined the stomach contents of more than 674 dogfish which have been freshly caught. In most cases the stomach was filled with finely comminuted fish, apparently of valuable market species or of bait, and with nothing else; in two cases, however, the stomach contents appeared to consist solely of ctenophores (a small transparent, jelly-like animal, ovoidal in shape, best known for its beautiful display of phosphorescence). Dogfish caught on hand lines are most suitable for ascertaining the nature of the food. Those caught upon trawls usually have had a long waiting period, when practically nothing is possible except to digest the food already secured; such specimens are consequently of no value for this purpose.

Breeding Habits.

The dogfish has a manner of breeding which essentially resembles that of birds and mammals. The smooth dogfish lays eggs which when freshly laid and removed from the shell have a size and general appearance similar to the yolk of a hen's egg. The color, however, is faintly yellow or pale cream. The horny shell enclosing these eggs is soft, yellowish and semi-transparent when newly laid; in shape, something like a rectangular purse. From the four corners long, tendril-like projections extend, by means of which the eggs are anchored among the sea weeds at the bottom. As in the case of birds, the development of the young begins before the eggshell is formed, so that when the egg is laid the young fish is considerably developed. When the young fish is fully developed, and ready to hatch, the yolk has practically all disappeared, having been consumed by the growing embryo, which now pushes through the open end of the shell and escapes into the water. The empty, black, horny shells are driven ashore by storms, and blow about our beaches, where they are popularly known as "sailors' purses" or "mermaids' purses."

In the case of the spiny dogfish, however, such eggshells are

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not formed, and the eggs are retained within the body of the mother until the development of the embryo is completed. At the time of hatching the young are from 5 to 6 inches long, and enter the water equipped with all the energy and ferocious instincts of the race. From 4 to 8 young are produced at a birth. The breeding process, as judged from the appearance of dissection, is a well-nigh continuous one. A female having young "pups" nearly ready for parturition usually has upwards of 4 eggs ready to take the place left by their predecessors as soon as these have been launched into the world. The spiny dogfish is said to bring forth from 10 to 20 young each year, but we are of the opinion that this number is underestimated. Whatever the number produced in a season, a very large percentage of them reach maturity, for soon after birth they swim very strongly, and are said to have been seen fiercely pursuing fish longer than themselves. Such an animal 6 inches long has comparatively few enemies, if we except his fellow sharks, and instances when "dog eats dog."

Extermination Impracticable.

The word "exterminate" has been misused in ordinary discussions of the dogfish problem. Extermination is impracticable, even if not impossible. The only aim can be to limit the rate of increase by catching the greatest possible number of individuals, especially of the adults. Conditions must be developed which should make it for the immediate pecuniary advantage of the fishermen to market every dogfish, both large and small, which can be caught; thus the fishermen may be induced to work for the advantage of their successors. The present and future public which will benefit most should pay the expense, just as to-day the public pays the expense of damage caused by dogfish to fishing gear.

Nature and Extent of Damage by Dogfish, as indicated by Special Reports.

The following typical statements from masters of Massachusetts fishing vessels indicate in part the nature and the extent of the damage caused by the spiny dogfish during the season of 1905: —

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September 5. — Schooner "Emilia Enos" of Provincetown, Capt. William Enos, arrived at Boston September 5 from South Channel, with a broken trip of 5,000 pounds of fresh haddock and 5,000 pounds of fresh codfish, the whole stock amounting to about $250. The broken trip was the result of the ravages of the dogfish. The trawls lost amounted to 30 tubs, valued at $150. If the dogfish were not numerous, an average catch would have been about 50,000 pounds of fish, and stock $1,000. On this trip, lasting about a week, the loss to this vessel, as will be seen, was $750, and is due directly to the dogfish. Captain Enos estimates that not less than 20,000 dogfish were on his hooks; they were so numerous as to carry off his trawls.

Schooner "William Morse," which arrived at Boston the same day, reports the loss of 8 or 10 tubs of trawls by dogfish.

September 6. — Schooner "Mary C. Santos" of Provincetown, which arrived at Boston to-day, lost 9 tubs of trawls, or about 4,500 hooks, by the ravages of the dogfish. She fished in South Channel, where the dogfish have been very troublesome the past two weeks. Six other arrivals at Boston to-day from the ground report the dogfish very troublesome.

The pollock arrivals to-day from Jeffreys Bank and from the north shore report dogfish quite numerous and bothersome.

There are about 25 vessels that come to this market from Nantucket Shoals with fresh codfish, which they catch on hand lines. These vessels are not troubled by the dogfish, for the reason that they all use cockles for bait, and they do not bite at that kind of bait.

September 7. — Schooner "Alena L. Young," Capt. Chas. Nelson, of Rockport, Mass., arrived at Boston August 26 from Jeffreys Bank pollock fishing, hand-line fishing. This vessel was out on the voyage ten days, and the crew of 10 men shared only 34 cents each, owing to the fact that dogfish were numerous on the fishing ground. Broken trips like this discourage the men, and often they leave the vessel.

Schooner "Evelyn L. Smith" of Boston, which arrived at Boston to-day from South Channel, reports the loss of about 500 hooks by dogfish. She brought in 7,500 pounds of fish, and would have had 40,000 pounds if the dogfish were not on the grounds. She fished in about 40 fathoms of water. Other arrivals at Boston to-day from South Channel came from the deeper part of South Channel, and report few or no dogfish.

The captain of the schooner "Harvester" of Provincetown states that in the spring of this year he was troubled by dogfish on the western part of Georges. On one voyage he lost 2,880 hooks.

September 8. — Capt. Herbert Nickerson of the schooner "Buema," which arrived at Boston to-day from South Channel, states that he was bothered more with dogfish this trip than any time this summer. He brought in 40,000 pounds of fresh haddock, 4,000 pounds of fresh codfish and 6,000 pounds of fresh hake. Reports losing 20 tubs of trawls, or about 10,600 hooks, besides the lines. He fished in 40 fathoms of water.

Schooner "Sea Fox" of Provincetown, Capt. B. S. Ramos, which arrived at Boston to-day from a fishing trip, reports the loss of 17

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tubs of trawls, or about 5,800 hooks, by the ravages of the dogfish. He fished in South Channel, in about 40 fathoms water.

September 9. — Captain Keough of the schooner "Carrie F. Roberts," which arrived at Boston to-day from fishing on Middle Bank, states that on some sets half his catch was destroyed by dogfish, mostly by biting the fish. He estimates his loss on this trip as 2,000 pounds of fish. He reports dogfish numerous on Middle Bank. He fished on the outer edge of the Bank, in deep water, where there was the least dogfish. Very few vessels are now fishing in Boston Bay for groundfish, on account of the abundance of dogfish.

Sloop "Laura Enos" of Gloucester, Capt. E. J. Rose, which arrived at Boston to-day from Jeffreys Bank, had 5,000 pounds of fresh pollock from hand-line pollock fishing. She would have had twice this amount of fish had the dogfish not been so plenty. She lost about 430 hooks.

Schooner "Marshall L. Adams" of Provincetown, Capt. Antonio Silva, which arrived at Boston to-day, reports the loss of about 1,500 hooks by dogfish while fishing in South Channel on the trip from which he had just arrived.

September 11. — Schooner "Fish Hawk," Capt. James Paine of Provincetown, which arrived at this port to-day from fishing in South Channel, reports great annoyance by dogfish on the trip from which he just arrived. He fished about 75 miles southeast of Highland Light, in 33 fathoms of water. The dogfish struck, and he lost 15 tubs of trawls, valued at about $5 per tub. They carried off 7,500 hooks, besides the trawl lines.

Schooner "Frances J. O'Hara," Captain Hickey of Boston, from South Channel, reports the loss of 9 tubs of trawls.

There have been arrivals at Boston the past few days from Jeffreys Bank, Georges Bank, Cashes Bank, Clarks Bank, Middle Bank, Nantucket Shoals, South Channel and shore grounds; none of them report any great loss on account of the dogfish. The arrivals from Jeffreys Bank, Middle Bank and the shore grounds, especially the eastern shore grounds, report more or less annoyance by the dogfish, and nearly all report small losses of hooks and gear.

A captain (Italian) of a gasoline boat, fishing out of Boston, informs me that he lost on one voyage about a month ago, while fishing in Boston Bay, about 2,000 hooks. This boat only carries 5 men and a total of 2,500 hooks, and fishes for codfish, haddock, hake, flounders, etc.

September 18. — Schooner "Marshall L. Adams" of Provincetown, Capt. A. C. Silva, arrived at Boston with a small catch of fish, due to the depredations of the dogfish. He had 6,000 pounds of fresh haddock, 20,000 pounds of fresh codfish and 1,000 pounds of fresh pollock. His loss in lines, hooks, etc., will amount to $150 on this trip. He lost 30 tubs of trawls, or 12,000 hooks. He fished in South Channel, 40 miles southeast of Highland Light, Cape Cod, and states that he never saw dogfish so plenty.

Schooner "Harvester" of Provincetown, Capt. Daniel Venturo, which arrived at Boston to-day, reports the loss of 15 tubs of trawls, valued at

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$75, while on fishing trip to South Channel. Sharks were also quite numerous.

The hand-line arrivals from Jeffreys and along the shore continue to report great annoyance by the dogfish, and the loss of several boxes of hooks each trip.

The Boston schooner "Onato," Captain Larkin, which arrived at Boston September 14, reports losing 20 tubs of trawls, valued at $100, on a fishing trip lasting one week in South Channel.

September 22. — Schooner "Nettie Franklin" of Provincetown, Captain Caton, arrived at Boston to-day from South Channel, with 24,000 pounds of groundfish. Captain Caton reports that the dogfish were very numerous, and on the last set of the trawls estimates that they caught as many as 20,000. He lost about 4 tubs of trawls, valued at $5 a tub.

The schooner "Mary C. Santos" arrived at Boston September 21 from South Channel with 9,000 pounds of fresh haddock, 31,000 pounds of fresh codfish and 2,000 pounds of fresh pollock. The captain states that he was very much bothered by dogfish, and would have had twice the amount of fish if it had not been for them. He lost 5 tubs of trawls.

The vessels arriving at Boston the past few days from other fishing grounds than South Channel report little or no annoyance by dogfish.

Capt. Stilson Hipson, of schooner "Mystery" of Plymouth, Mass., which arrived at Boston from a fishing trip on Sept. 27, 1905, reports that dogfish were very numerous in South Channel. He set 24 trawls 70 miles southeast of Highland Light, Cape Cod, and only caught 3,000 pounds of marketable fish, getting a dogfish on every other hook. He should have caught 15,000 pounds of marketable fish on average fishing in that locality. He had to leave that locality on account of the dogfish.

Schooner "Marshall L. Adams" of Provincetown, Mass., Capt. A. C. Silva, which arrived at Boston September 28, reports dogfish still numerous on the in-shore fishing grounds off Cape Cod, but not very plenty off shore.

Schooner "Fish Hawk" of Boston arrived at Boston from a fishing trip on November 1. The captain reports setting 45 trawls in South Channel, in 45 to 50 fathoms of water. The dogfish were numerous, and he only got 100 pounds of food fish; whereas, if there had been no dogfish, on an average set he would have caught 7,000 pounds of food fish.

October 12. — The shore arrivals report dogfish very numerous along the shore and in Boston Bay, where it is almost impossible to set their fishing gear. The hand-line pollock fishermen, of which there are a large number, are experiencing a great deal of trouble with dogfish.

Arrivals from Georges Bank and South Channel also report finding dogfish more or less troublesome, but they are not so plentiful on these grounds as on the shore.

Captain Keough of the schooner "Carrie F. Roberts," which arrived at Boston from fishing in Boston Bay October 10, states that he caught

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300 dogfish on 500 hooks set for groundfish the previous day. On a string of gear of about 4,500 hooks he got 1,800 dogfish.

Capt. Ed Doane of the schooner "Mertis H. Perry," which arrived at Boston October 9 from trawling in Boston Bay, reports much trouble from the dogfish, but no great loss of gear. He is of the opinion that if all the vessels in the fishing business should fit, and catch dogfish, they would not be able to reduce them in number, as they are so prolific and numerous.

Schooner "Louise Cabral," which arrived at Boston October 9, reports catching a dogfish with a rubber band around its head, just behind the pectoral fins, which had cut into the fish, and had evidently been on it some time. It was caught on a trawl, while fishing for groundfish off Chatham, October 8. It was a smooth dogfish, about a foot long.

Schooner "Emilia Enos" of Provincetown, Captain Enos, which arrived at Boston October 3, reports much annoyance by sharks while fishing in South Channel.

Capt. Alfred Green of the schooner "Flirt" of Gloucester, Mass., which arrived at Boston Oct. 19, 1905, from a fishing trip in South Channel, states that he lost $50 worth of gear by sharks. He fished 70 miles southeast by south of Highland Light, in about 70 fathoms of water.

The schooner "Illinois" of Gloucester, Mass., Capt. John Lowrie, which arrived at Boston Oct. 17, 1905, reports losing $100 worth of trawls by getting into a large school of dogfish. He fished in South Channel, in about 70 fathoms. He caught at least 10,000 dogfish on this voyage alone. He lost 20 tubs of trawls, which will have to be replaced by new gear.

October 16. — The captain of the schooner "Mary Edith" made five sets on the shore recently. In three sets he caught 16,000 pounds of marketable fish, but in the other two the dogfish struck, and he caught only 1,000 pounds of marketable fish.

Captain Benson of the schooner "Frances V. Sylvia," which arrived at Boston Oct. 20, 1905, reports losing 10 tubs of trawls by dogfish. He was out one week on the voyage, and fished in South Channel.

November 17. — Schooner "Marshall L. Adams" of Provincetown, Capt. A. C. Silva, which arrived at Boston Nov. 4, 1905, reports dogfish very numerous from Highland Light, Cape Cod, south along the shore. Small-sized dogfish are numerous close in shore; off shore they are large in size, but not so numerous. He lost 6 tubs of trawls on this voyage, worth about $36, due mostly to the dogfish.

Capt. Julius Anderson of the Boston schooner "Robert & Arthur," which arrived at Boston Nov. 10, 1905, from a fishing trip, states that he found dogfish numerous in the northern as well as the southern part of Georges Bank. On the southern part of the Bank he set his trawls, and only got about 10 edible fish to a dory, as the dogfish were so numerous. He lost 10 tubs of trawls, valued at about $60.

From the point of view of the shore fishermen, the following report is typical: —

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BOSTON, July 31, 1905.

Dr. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

SIR: — After making an observation in regard to the effect of dogfish and other predatory fish upon food fish, I have the honor to submit to you the following report.

Two fishermen started from Gloucester on Friday morning, at 2 A.M., and arrived at Kettle Island trap, where they purchased 4 bushels of bait, for which they paid $1.70. After baiting their trawls, which consisted of 3 tubs of 9 lines each, 50 hooks to a line, and 2½ tubs of 10 lines to a tub, also having 50 hooks on each line, they proceeded to a place called Eagle's Ledge, which lies 5 miles southeast from Baker's Island and about 13 miles from Gloucester. These trawls, containing 2,600 hooks, and covering a distance of 3 miles, were set at 1 P.M., which required one hour, after which they started for Gloucester, arriving at 4 P.M.; time consumed, fourteen hours.

On Saturday morning a start was made at 2 A.M. from Gloucester to haul the trawls. They were found at 6 A.M., as it was very moderate, and fog was quite thick. The work was finished at 11 A.M., and after the boat arrived at Gloucester and discharged her fish it was 2 P.M.; time consumed, twelve hours.

The result was as follows: —

100 hooks, holding	100 baits.
131 hooks, holding	131 food fish.
13 hooks, holding	13 food fish, destroyed.
7 hooks, holding	7 monk fish.
65 hooks, holding	65 skates.
238 hooks, holding	238 small dogfish.
74 hooks, holding	74 large dogfish.
9 hooks, holding (lost hauling in)	9 large dogfish.
3 hooks, holding (lost hauling in)	3 food fish.
1,900 hooks, holding	nothing.

2,540 hooks (2,600 — 2,540 = 60, — 60 hooks lost).

Income: —

131 food fish, 780 pounds, at 80 cents per hundred (average price per fish, 4 $\frac{80}{100}$ cents),	$6 24	
74 large dogfish yielded 2½ buckets of livers, at 25 cents per bucket,	63	
		$6 87

Outgo: —

13 food fish destroyed, at 4 $\frac{80}{100}$ cents each,	$0 62	
60 hooks lost, valued at	14	
60 gangings lost, valued at	14	
85 hooks broken in removing dogfish, etc.,	18	
85 gangings parted in removing dogfish, etc.,	18	
2,350 baits consumed by dogfish,	1 56	
		2 82
Net profits for 2 men, twenty-six hours' work,		$4 05

Small dogfish measured 15 to 19 inches, and weighed from 1½ to 2½ pounds each. Large dogfish measured 35 to 40 inches, and weighed

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from 15 to 20 pounds each. These were all female fish, and were depositing young fish; the stomachs contained an occasional piece of bait and food fish. The small dogfish were hardly large enough to get the hook into their mouths.

Two days previous this same fishing gear was set in about the same location, and 2,000 pounds of food fish and 140 to 150 large dogfish and no small dogfish were caught. It is the opinion of the fishermen that the small dogfish eat the bait without getting caught to any extent.

Time consumed in the work, twenty-six hours; persons employed, 2. This is considered an average by the fishermen.

Yours respectfully, EDWIN C. McINTIRE.

On June 24 Mr. Paul M. Carpenter went to Provincetown to study the dogfish, with particular reference to the damage done directly and indirectly to marketable fish and to fishing gear. Mr. Carpenter went on several trips on fishing vessels which reported damage by dogfish. His personal observations, as embodied in his interim reports, follow: —

PROVINCETOWN, July 26, 1905

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — Schooner "Marshall L. Adams" of Provincetown, Antone Silva, master; trawler, 130 tons register; crew of 20 men; 75 miles southwest of Highland Light. Catch: cod, haddock and occasional halibut; several finback whales seen.

The dogfish, much to the surprise of the crew, were less plentiful than usual at this point and at this season of the year. The trawls brought up at each haul a large number of deep-sea scallops.

A sudden squall struck the vessel one day, with heavy wind and rain, sweeping overboard about 5,000 weight of fish, which had just been landed from the trawls. This catch included a number of dogfish, possibly 50. The squall struck the vessel so suddenly and so soon after the haul that there had been no time to examine the catch, and the entire haul was lost.

Of course a certain number of the dogfish hooked were lost in hauling in the different dories during the week of fishing. I had an opportunity, however, of examining about 250 dogfish. The larger proportion of these were not fully grown, and I noted that of the fish caught fully 4 out of 5 were females. Upon opening and dissecting the mature specimens, I found in every case, 4 fully developed embryos. In each case the egg-string contained a large number of eggs, in groups of 4, in various stages of development.

Upon examining the stomachs of the fish caught, I was surprised to find, with scarcely an exception, no material whatever except apparently what had been taken from the bait of the trawls. Upon examining the edible fish caught on the trawls, it was noticeable that very few presented the appearance of having been attacked by dogfish.

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From these last two facts stated, together with the fact already stated, that the majority of the dogfish caught were not fully grown, it seems fair to conclude that the pugnacious nature in dogfish does not develop until they reach maturity. I found no trace of lobsters or of shellfish in the stomachs.

At Boston, on arrival of the schooner for a market, I transferred to the schooner "Annie Perry," Captain Perry, just about to sail for Provincetown, and returned to port on that vessel. On questioning the crew of the "Perry" I learned that their catch of dogfish on the trip just ended (and which had been to the same fishing ground as that visited by me) had been unusually small and comparatively insignificant.

It is the common opinion of the fishermen of Provincetown, as I have learned by extended inquiry, that the dogfish are far more troublesome in the month of August and the succeeding months than in any other time of the year. This would seem to indicate that the fish mature in August, both in size and in voracity.

I intend to take, if possible, about three more trips, and shall include the seiners and boat fishermen; and shall also investigate the condition of the dogfish problem in the harbor and vicinity.

Very respectfully, PAUL MOULTON CARPENTER.

PROVINCETOWN, Aug. 9, 1905.

Dr. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — While awaiting the return to the harbor of the mackerel seiners, on one of which I design to make a trip, I have employed my time in examining the harbor fisheries with reference to the dogfish problem. The report is unanimous that dogfish are far less numerous than usual thus far this season. Employees of the Consolidated Weirs Company, which concern operates several large weirs or traps within and just without the harbor, report that no dogfish are at the present time caught in these traps. A similar report comes from the owners of three weirs at the west end of the harbor. A boat came in to-night from a day's fishing at "the ledge," a favorite fishing ground for Provincetown fishermen, about 10 miles off Race Point and about midway between that point and Plymouth. They report good fishing for pollock, and only 3 dogfish caught during the day; these were "pups," about 1 foot in length.

The scarcity of dogfish in this vicinity is taken by the local fishermen in connection with a scarcity of mackerel which also prevails. It is the general prediction that the dogfish will return with the return of the mackerel schools in the bay. The mackerel is generally believed to be the favorite food of the dogfish; but it does not despise the cod, haddock or pollock when the mackerel is not at hand and easily obtained. It is common for trawlers to find on their trawls fragments of large fishes, and sometimes merely the heads of fishes, which have been caught on the trawls, and thus, unable to defend themselves, are attacked and eaten by the dogfish.

It is a persistent report among the fishermen of this port, and one which I hear constantly, that the dogfish have followed the mackerel

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to the Maine and Nova Scotia coast. In support of this theory I annex a newspaper clipping, which originally appeared in the "New York Sun," concerning the dogfish on the coast of Maine. (See p. 166.)

I note the remarkable scarcity this summer of squid, which are used largely by fishermen for bait. While they at times swarm in great multitudes in this harbor, this summer the squid have been remarkably scarce. Porgies and herring are chiefly used for bait. Until recently porgies have also been scarce, but within the past few days there have been several large catches reported. The scarcity of bait has been a great injury to the Provincetown fisheries.

Two matters of possible interest to the commission, though not directly connected with the object of my appointment, are considered in special reports annexed herewith.

Very respectfully, PAUL MOULTON CARPENTER.

PROVINCETOWN, Aug. 19, 1905.

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — Schooner "Saladin," Capt. Florence M. McKown of Gloucester, seiner, left harbor of Provincetown August 13, at 4 A.M., accompanying a fleet of 60 sail of seiners. Watch was set when off Race Point, and was continued past Highland Light and out to sea, to a point about 70 miles southwest from the last-named point. The fleet remained in the channel about two days, and then coasted along the shore past Wellfleet and Truro, and thence to Minot's Ledge, and returned towards Cape Cod. The fleet was then obliged to seek harbor on account of storm, having been absent from port about five days. No mackerel were seen, and a number of vessels of the fleet which were spoken reported the same. The results of the trip, in the study of dogfish, were therefore disappointing.

Almost immediately upon my return to port a large school of dogfish were reported to have entered the harbor, and I am now engaged in inquiries as to their movements. I am also making some inquiries concerning some experiments, which I learn were made some years ago in this place, in the utilization of dogfish in the manufacture of oil and fertilizer. The results of these inquiries I will report later.

Very respectfully, PAUL M. CARPENTER.

PROVINCETOWN, Sept. 9, 1905.

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — On the morning of September 5 I went with one of the dory fishermen to the Ledge, a favorite fishing ground for Provincetown fishermen. We left Provincetown at about 4 o'clock A.M., reaching the grounds about 7.30. The wind was northeast; the tide was just about one-half; the depth of water at this point was about 20 fathoms. The fishing was on the bottom, the hooks just off the bottom. The catch amounted to about 4 hundredweight: about 1 hundredweight of cod, 2 hundredweight of pollock and 1 hundredweight of whiting. Not a single dogfish was hooked.

On the morning of September 7 we fished off Wood End, but still

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no dogfish. We fished in about 30 fathoms of water, on a slack tide. The wind at this time was about northeast. The catch amounted to 5 hundredweight: 2 hundredweight of pollock, 1 hundredweight of cod (small), 1 hundredweight of hake and 1 hundredweight of whiting.

The squid have struck in here, having been for some time very scarce. The vessels are consequently starting for the middle banks and the channel. I have made arrangements to go on the schooner "Annie Perry" the first of the week.

The "Georgiana," hailing from this port, has just returned from the channel, reporting a catch of 90,000 pounds, including 25,000 pounds of large cod. She reports not a single dogfish taken on the trawls.

I will do my utmost to obtain data that will be of value to the commission on my trip to the channel.

Very respectfully, PAUL M. CARPENTER.

PROVINCETOWN, Sept. 11, 1905.

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — On Saturday, September 9, a party of 8 went to the Ledge for a day's fishing, and this time succeeded in finding a few dogfish. We started from Provincetown at 6 in the morning, and reached the fishing ground at 9 o'clock. We fished on the slack tide. The depth of water at this point was about 15 fathoms; the wind about north. The fishing was very good indeed for this season of the year. The catch amounted to about 12 hundredweight, mostly cod, pollock and hake, with a few haddock.

The dogfish, as the annexed list shows, although they stayed with us all the time, did not bite except at intervals. I examined the stomachs of the 48 caught, and found nothing except the bait taken from the hooks, and also long strings of tentacles which had been detached from medusæ.[1] The annexed list will show at what intervals the dogfish were caught.

Very respectfully, PAUL MOULTON CARPENTER.

Schedule of Fishing at Ledge, off Race Point, Cape Cod, Saturday, Sept. 9, 1905.

Dogfish, cod, haddock, whiting.
Dogfish, cod, pollock.
Dogfish.
Dogfish.
Dogfish, hake, pollock, pollock, whiting.
Dogfish, hake, pollock, hake, cod, cod.
Dogfish, pollock, pollock, hake, cod.
Dogfish.
Dogfish, pollock, cod, hake, cod.
Dogfish, pollock, hake, cod, pollock.
Dogfish, cod, pollock, hake.
Dogfish, pollock, cod, cod, hake, pollock.
Dogfish, pollock, cod, pollock, hake.
Dogfish, pollock, cod, pollock, hake.
Dogfish.
Dogfish, cod, pollock, hake.
Dogfish, cod, pollock, pollock.
Dogfish, pollock, pollock, cod, hake.
Dogfish, cod, pollock, pollock, cod.
Dogfish.
Dogfish, cod, pollock, hake, pollock.
Dogfish, pollock, pollock, cod.
Dogfish, cod, pollock, pollock.
Dogfish, pollock, cod, hake, pollock, pollock.
Dogfish, cod, cod, pollock, hake.

[1] I have found dogfish stomachs full of ctenophores very much shrunken and shrivelled in appearance. — G. W. FIELD.

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Schedule of Fishing, etc. — Concluded.

Dogfish, cod, pollock, hake, cod, cod.
Dogfish, pollock, hake, pollock, cod, cod.
Dogfish, pollock, pollock, cod, hake.
Dogfish.
Dogfish, cod, cod, pollock.
Dogfish, pollock, cod, pollock, hake, cod.
Dogfish, cod, pollock, hake.
Dogfish, cod, cod, hake.
Dogfish, hake, cod, cod.
Dogfish, pollock, pollock, cod, hake.
Dogfish, pollock, pollock, cod.
Dogfish, cod, pollock, hake.
Dogfish, hake, cod, pollock, pollock.
Dogfish, pollock, pollock, cod.
Dogfish, cod, pollock, pollock, hake.
Dogfish, cod, pollock, hake, cod.
Dogfish, haddock, cod, pollock, hake.
Dogfish, pollock, cod, haddock, pollock.
Dogfish, cod, pollock, pollock, hake.
Dogfish, pollock, cod, cod, pollock, hake.
Dogfish, cod, hake, haddock.
Dogfish, cod, pollock, hake, cod.
Dogfish, pollock, cod.

PROVINCETOWN, Sept. 25, 1905.

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — Schooner "Annie Perry," 117 tons register, left Provincetown for channel September 21, after a delay of more than ten days, caused by scarcity of bait. She is commanded by Capt. Marion Perry, and carries a crew of 20 men. The first set of trawls, which was made on the morning of the 22d, brought in nothing but dogfish for the first 4 dories, which set, as the captain said, in shoal water. The other 6 dories caught dogfish on their first 2 tubs of trawl, but on the remaining 3 dogfish were very few, biting at only every fifth or sixth hook. The wind was blowing brisk southwest, and the set was made in 45 fathoms of water.

The second set, on the afternoon of the same day, showed that the dogfish had practically left, as they were caught on the trawls at only the tenth or twelfth hook. The wind still held to the southwest, and the water at this point was 50 fathoms.

The second day of fishing developed the same facts as on the afternoon of the first day. The dogfish on this day, however, were very large, — larger, the captain said, than he had ever seen before. They averaged 3½ and 4 feet in length, no small ones being caught. On the second day a large school of sharks, none of which were less than 10 feet in length, and one fully 15 feet in length, swarmed about the vessel. They were evidently after the bait, which was thrown overboard. They were not easily frightened. Two were caught and hauled on board and killed, and the carcasses thrown over again. The wind on the second day was about northwest, and the depth of water 55 fathoms.

At the end of the second day I had been able to examine 300 dogfish. In each case nothing was found in the stomachs save the bait taken from the trawls. In the majority of cases there were evidences of great voracity, the stomachs being crowded to their fullest capacity. It was noticeable that fully three-fourths of the dogfish caught were females. In no case did their bodies contain developed young.

The third day's fishing was in about 60 fathoms of water, and each dory brought in from 6 to 10 dogfish. I was able to examine 50 of these, and the result was the same as in the examinations on the previous days.

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It might be well to explain that on the second day the dogfish came so fast that the men found it difficult to save their gear. On this account, only a small percentage of the fish were saved for my examination. The result of the trip shows beyond doubt that the dogfish run in schools, for the most part in shoal water. Among fishermen, from 40 to 50 fathoms is considered shoal. I have made inquiries here at Provincetown, and up to date this year hear no complaint of gear being lost by the depredations of dogfish.

Respectfully, PAUL MOULTON CARPENTER.

PROVINCETOWN, Sept. 28, 1905.

DR. GEORGE W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — I deemed it best to defer, until near the close of my investigation concerning dogfish, any systematic inquiries concerning the damage done to gear by these fish; by so doing I should be able to procure more complete statistics. Upon my return from my recent trip to the channel, therefore, I began a systematic canvass of the captains and agents of the fishing vessels of this town, with the following results: —

Schooner "Fish Hawk," Capt. Joseph Paine, lost 20 tubs of trawl during her last two trips to the channel.

Schooner "Louisa Silva," Captain Silva, lost 15 tubs of trawl, during the same two trips.

Schooner "Louisa Cabral" lost 20 tubs during the last three trips.

Schooner "Sea Fox" lost 17 tubs in the middle of September.

Schooner "Julia Costa" lost 8 tubs during the last two trips.

Schooner "Philip Manta" lost 24 tubs during the last two trips.

The total damage experienced by these 6 vessels is, therefore, 104 tubs of trawl, worth $8.50 each, making a total loss of $884, — an average of $147.33 each. There are still other vessels to be heard from, which are in the channel at the present time. The captains and agents of vessels all declare that when squid are used as bait there are plenty of dogfish on the trawls. On the other hand, when white bait is used, as porgie, herring, etc., fewer dogfish are found on the hooks.

There has been no mention of damage done by dogfish until within the last two trips.

It may be well to mention that the dogfish now caught are of different appearance from those seen earlier in the season. They are of a sandy color, and the ventral portion of white extends farther round. They are not as rough to the touch as formerly, but are quite smooth. All agree that the dogfish now running are very large, and that the men are obliged to work very hard to save their trawls from destruction.

Each vessel is allowed 60 tubs of trawl a year. When the dogfish are very plenty the allotted number is used, and sometimes the number is greatly exceeded.

I shall continue my canvass, and report further on this subject.

Very respectfully, PAUL MOULTON CARPENTER.

I am able to add two names to the list of vessels whose gear has been lost or damaged through the depredations of dogfish: —

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Schooner "Marshall L. Adams," Capt. Antone Silva, reports 8 tubs of trawl lost on last two trips.

Schooner "Mary C. Santos," Captain Santos, reports 15 tubs of trawl lost during the same two trips.

Both captains think that they fished too far to the southward. Other vessels are expected in a day or two.

The following is a statement by Deputy Foster, on the launch "Egret," covering the month of July: —

I have seen almost every trap hauled between Nahant and Rockport, and saw but one large lot of dogfish, and that was the trap at Dana's Island. There were in this haul about 75 barrels, which were taken off shore and thrown away. I saw one boat off Half-way Rock. I watched the hauling of the trawls for one-half hour, and, as near as it was possible for me to tell, he caught 250 dogfish and not much of anything else, for there were a dozen small codfish and haddock, mostly eaten up. The shore fishermen complain that they are having lots of trouble with them. There are some in every trap I saw hauled, but in most of them not enough to be very troublesome. In the Kettle Island trap they had 5 barrels of "bluebacks," 42 small dogfish and not much of anything else.

Our special agents interviewed 584 fishermen, from Newburyport to Newport, including masters of vessels, shore, net, trawls and hand line, and trap and weir fishermen. These agents asked questions designed to secure free, full and accurate replies to the questions below. This information has been tabulated. The questions and the results of the tabulated returns are as follows: —

Apparatus used (specify kind of apparatus used, and number of each kind). Hand lines, 6,833; nets, 8,224; gills, 1,536; tubs, 8,915; trawls, 1,742; weirs, 45.

How many pounds do you consider your average total annual catch of edible and bait fish? 194,915,050.

What do you consider a fair estimate of your annual catch of dogfish? 27,668,150.

Is this number a guess, or is it estimated on actual counts for a week or a month? Fair estimate.

During what months is the smooth dogfish present? April to December; most numerous in May and June and October to December. Practically limited to waters south of Cape Cod.

During what months is the spiny dogfish present? April to December in all waters off shore, to 50 to 75 fathoms.

Do dogfish damage your apparatus? Yes, 586; no, 3.

What do you consider a fair estimate of the annual damage done by dogfish to your seines, nets, trawls, bait, hand lines, weirs, traps?

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Seines, $6,550; nets, $27,181; trawls, $58,998.50; bait, $56,158; hand lines, $10,830; weirs, $1,000; traps, $100; total, $160,817.50.

Is the above figure a guess, or is it based upon actual records of expenses caused by dogfish, of loss of material and of time spent in repairs? Fair estimate, 475; guess, 89.

Are many fish caught by your apparatus eaten or bitten by dogfish so as to destroy market value? Yes, 533; no, 41.

What do you consider a fair estimate of the value of the fish caught in your apparatus and made worthless by dogfish? $250,405.

Do you kill the dogfish captured? Yes, 511; no, 40.

In your opinion, does the dogfish do appreciable damage to the supply of edible and bait fish? Yes, 578; no, 3.

Has there been an average total catch of fish this season? Yes, 233; no, 353.

Do you note any increase or decrease in the numbers of dogfish in the past year? Increase, 346; about same, 159; decrease, 86.

In your opinion, has there been an increase or decrease in the past ten years? Increase, 544; decrease, 22; about the same, 2.

Do you make any use of dogfish? Yes, 44; no, 506.

If so, what? Livers.

What value do you place on the dogfish so used? $444.

What, in your opinion, would be the effect of a bounty on dogfish? Good, 582; bad, 7.

Would it decrease the number of dogfish? Yes, 523; no, 3.

Would it increase the profits of the fishermen? If so, how? Yes, 569; no, 12.

Would it increase the supply of food fish, and thus benefit the public? Yes, 587; no, 1.

Would a decrease in the number of dogfish lessen the expense of catching food fish? Yes, 584; no, 3.

The following is a copy of the circular used to secure the information from which the preceding returns were tabulated: —

COMMONWEALTH OF MASSACHUSETTS,
COMMISSION ON FISHERIES AND GAME, STATE HOUSE, BOSTON.

Acting according to chapter 12 of the Resolves of 1905, the Massachusetts Commission on Fisheries and Game requests from you a statement containing information which may be used in support of a bill pending in Congress "to provide for the extermination of the dogfish and other predatory fish." The evidence of the damage caused by these fish must be put in proper form. It is of the greatest importance that you make your answers as accurate as possible, so that the information may be of some value. You are therefore requested to give the following questions the fullest and fairest answers possible.

Apparatus used (specify kind of apparatus used, and number of each kind).

How many pounds do you consider your average total annual catch of edible and bait fish?

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What do you consider a fair estimate of your annual catch of dogfish?

Is this number a guess, or is it estimated on actual counts for a week or a month?

During what months is the smooth dogfish present?

During what months is the spiny dogfish present?

Do dogfish damage your apparatus?

What do you consider a fair estimate of the annual damage done by dogfish to your nets, trawls, bait, hand lines?

Is the above figure a guess, or is it based upon actual records of expenses caused by dogfish, of loss of material and of time spent in repairs?

Are many fish caught by your apparatus eaten or bitten by dogfish so as to destroy market value?

What do you consider a fair estimate of the value of the fish caught in your apparatus and made worthless by dogfish?

Do you kill the dogfish captured?

If so, how? (Clubbing, stabbing, cutting off tail, etc.)

In your opinion, does the dogfish do appreciable damage to the supply of edible and bait fish?

Has there been an average total catch of fish this season?

For how many years have you fished in Massachusetts waters? Where?

Do you note any increase or decrease in the numbers of dogfish in the past year?

In your opinion, has there been an increase or decrease in the past ten years?

What, in your opinion, is the cause?

Do you make any use of dogfish? If so, what?

What value do you place on the dogfish so used?

What, in your opinion, would be the effect of a bounty on dogfish?

Would it decrease the number of dogfish?

Would it increase the profits of the fishermen? If so, how?

Would it increase the supply of food fish, and thus benefit the public?

Would a decrease in the number of dogfish lessen the expense of catching food fish?

Remarks: —

Name

Name of vessel

Town

County

Date

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Replies to the above circular have been received from the following persons: —

Name.	Town.	Name of Vessel.
Abrahamson, A. S.,	Gloucester,	Scud.
Acker, Joshua,	Swampscott,	(Dory.)
Adams, Charles C.,	Newburyport,	(Gasoline boat.)
Ahlquist, Erik,	Rockport,	Jessie P.
Allen, William,	Marblehead,	(Gasoline boat.)
Amiro, Adolphus,	Beverly,	James R. Clark.
Anderson, G. B.,	Gloucester,	Rob Roy.
Anderson, Julius,	Boston,	Robert and Arthur.
Andrews, Elmer,	Ipswich,	(Gasoline boat.)
Andrews, Fuller A.,	Manchester,	(Sail boat and a weir.)
Atkinson, W. B., & Co.,	Ipswich,	(Gasoline boat.)
Atwood & Corrigan,	East Brewster,	(Three dories.)
Atwood, John,	Gloucester,	Yakima.
Aubin, Bennett,	Newburyport,	(Dory.)
Avela, Joseph, 2d,	Provincetown,	(Sail dory.)
Avina, Manuel,	Gloucester,	Eva Avina.
Bailey, Samuel S.,	Ipswich (Grape Island),	(Gasoline boat.)
Bailey, William,	Rockport,	Alena L. Young.
Bangs, John B.,	Provincetown,	John W. Caswell.
Barrett, Jacob P.,	Gloucester,	Marguerite.
Barrett, John F.,	Gloucester,	Lillian.
Bartles, Henry,	Rockport,	Evelyn M.
Barton, John,	Rockport,	Mercedes.
Bassett, Daniel S.,	South Chatham,	(Sail boat.)
Bassett, Frank,	Barnstable,	Two Friends.
Bayley, Charles A.,	Ipswich (Grape Island),	(Gasoline boat.)
Bearse, George N.,	South Chatham,	(Sail boat.)
Bearse, Washington,	Chatham,	(Sail boat.)
Benham, Robert B.,	Gloucester,	Lizzie W. Hunt.
Bennett, John,	Manchester,	(Dory.)
Benson, Benjamin T.,	Provincetown,	Frances V. Sylvia.

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Name.	Town.	Name of Vessel.
Bergsten, Peter,	Gloucester,	Wodan.
Bigalke, Agust,	Rockport,	Etta B.
Bignall, J. H.,	Plymouth,	Katie L.
Black, Stephen,	Gloucester,	Indiana.
Blackman, David B.,	Brant Rock,	Gracie.
Blades, Leslie,	Boston,	John M. Keen.
Blanchard, Fred,	Swampscott,	(Dory.)
Boozeli, Tony,	Boston,	Two Brothers.
Boudort, Alfred,	Gloucester,	Georgianna.
Boudreault, Lawrence,	Boston,	Genesta.
Boudreault, Thomas A.,	Provincetown,	Esther Gray.
Bowden, Benjamin,	Lanesville,	Venus.
Boyden, Walter,	Swampscott,	(Dory.)
Brackett, Theophilus,	Swampscott,	(Dory.)
Braja, Joseph,	Rockport,	Vamos.
Brazier, Eben A.,	Gloucester,	Petrel.
Brewer, Roland,	Boston,	M. Madeline.
Briggs, Charles,	Marblehead,	(Dory.)
Brigham, J. O.,	Boston,	Shepherd King.
Brinnick, William P.,	Boston,	Jennie Maud.
Brooks, John S.,	Gloucester,	Ida.
Brown, Alonzo L.,	Ipswich,	(Gasoline boat.)
Brown, George A.,	Provincetown,	A. Brown.
Burch, A. L.,	Provincetown,	Jennie A. Hooper.
Burgess, Warren,	East Brewster,	– –
Burnham, Leroy,	Essex,	(Gasoline boat.)
Burnham, Sherman,	Essex,	(Gasoline boat.)
Burns, John,	Boston,	Mary F. Fallon.
Bushee, Alexander D.,	New Bedford,	Leone.
Butler, George,	Swampscott,	(Dory.)
Cahoon, Alonzo F.,	South Chatham,	T. J. Carroll.
Cahoon, Otis,	Swampscott,	(Dory.)
Cain, Frank,	Gloucester,	Day Dream.
Callahan, Leonard,	Essex,	(Gasoline boat.)

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Name.	Town.	Name of Vessel.
Callahan, Michael,	Essex,	(Gasoline boat.)
Cameron, Reuben,	Gloucester,	Grayling.
Campbell, Charles J.,	Provincetown,	Active.
Carlos, E. M.,	Gloucester,	Pythian.
Carroll, Frank,	Gloucester,	M. H. Perkins.
Carter, Edward H.,	Gloucester,	Sarah.
Caswell, Charles A.,	Newburyport,	(Dory.)
Caton, John B.,	Provincetown,	Albert Brown.
Chapman, Hiram,	Gloucester,	Ramona.
Chapman, John C.,	Beverly,	Trump.
Chard, Frank,	Gloucester,	Bessie A.
Chase, John,	Newburyport,	(Sail boat.)
Chitwynd, William C.,	Gloucester,	Volant.
Christianson, Martin,	Gloucester,	Patriot.
Churchill, Henry A.,	Ipswich,	(Gasoline boat and dory.)
Cilley, C. B.,	Newburyport,	(Dory.)
Cilley, James,	Newburyport,	(Dory.)
Claxton, John F.,	Ipswich,	(Gasoline boat.)
Clay, Manuel,	Provincetown,	(Power dory.)
Cobb, John K.,	Provincetown,	Betsey Ross.
Coffin, Frank,	Newburyport,	(Dory.)
Colberg, Ed.,	Newport, R. I.,	Winnie Kane.
Colson, Samuel,	Gloucester,	Margaret.
Connolly, John,	Rockport,	Leo.
Contrino, Gaspi C.,	Rockport,	(Gasoline dory.)
Cook, Jerry E.,	Gloucester,	Carrie Babson.
Cooney, James S.,	Rockport,	Annie and Jamie.
Coop, John F.,	Provincetown,	Florence.
Corca, William J.,	Provincetown,	Lear C.
Corkum, William,	Gloucester,	Diana.
Costa, Emanuel,	Provincetown,	Jessie Costa.
Costa, John,	Provincetown,	(Power dory.)
Costa, John,	Provincetown,	(Power dory.)
Costa, J. E.,	Boston,	Mildred Robinson.

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Name.	Town.	Name of Vessel.
Courant, Antone,	Gloucester,	Smuggler.
Crane, Herman,	Ipswich,	(Gasoline boat.)
Crittenden, Samuel,	Gloucester,	Mattie Winship.
Crocker, Dean F.,	Gloucester,	Wm. H. Clements.
Crooks, James,	Newburyport,	(Dory.)
Crouse, Oberlin,	Gloucester,	Agnes Downes.
Crowell Cold Storage Company,	East Dennis,	– –
Crowell, I. K.,	Boston,	Zephyr.
Crowell, Leonard,	Gloucester,	Claudia.
Crowell, Thomas,	Gloucester,	Carrie C.
Crowley, Emanuel,	Provincetown,	Lucy E.
Cunningham, E. J.,	Boston,	Stranger.
Currier, Charles S.,	Newburyport,	(Dory.)
Curtis, Edward,	Marblehead,	(Dory.)
Curtis, Henry W.,	Gloucester,	Mary F. Curtis.
Cushing, William M.,	Green Harbor,	– –
Cushman, Cassius E.,	Rockport,	Mary J. Ward.
Daggett, Allton,	Provincetown,	Pearl.
Daley, Jason M.,	Boston,	Muriel.
Daly, H.,	Boston,	Harmony.
Davis, Charles,	Beverly,	Viking.
Davis, Joseph F.,	Provincetown,	Bessie.
Davis, Manuel,	Provincetown,	M. Enos.
Dent, John T.,	Marblehead,	Yankee.
Devine, Archie,	Gloucester,	Arthur James.
Devine, Norman,	Gloucester,	James A. Garfield.
Devine, William A.,	Boston,	Rapidan.
Doane, Ed. E.,	Swampscott,	Mertis H. Perry.
Doane, Lorenzo F.,	Harwichport,	Athlete.
Dolan, John E.,	Ipswich,	(Gasoline boat.)
Doleman, Allen,	Gloucester,	Appomattox.
Domingoes, Manuel,	Gloucester,	Belbina P. Domingoes.
Doucette, Charles E.,	Gloucester,	Acacia.
Douglass, Fred G.,	Gloucester,	Gladys Lee.

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Name.	Town.	Name of Vessel.
Douglass, George W.,	Gloucester,	Mary Elizabeth.
Douglass, Joseph G.,	Gloucester,	(Trap.)
Douglass, Rodney,	Swampscott,	(Dory.)
Douglass, Simon,	Swampscott,	(Dory.)
Douglass, Thomas,	Gloucester,	(Trap.)
Downie, Thomas,	Gloucester,	Monarch.
Dresser, William W.,	Rockport,	Mildred.
Dunsky, Peter P.,	Gloucester,	Hattie L. Trask.
Dwyer, James,	Gloucester,	Annie Greenlaw.
Eaton, Jabez M.,	Newburyport,	(Dory.)
Eaton, James,	Newburyport,	(Dory.)
Eaton, Lurin F.,	Newburyport,	(Dory.)
Eaton, Nelson,	Newburyport,	(Dory.)
Eaton, William,	Newburyport,	(Dory.)
Edwards, Antone,	Provincetown,	(Power dory.)
Eldredge, James, & Son,	Brewster,	- -
Eldridge, Seth W.,	Harwichport,	Beatrice Earle.
Ellis, Gilbert E.,	East Brewster,	(Dories.)
Elwell, Sylvanus,	Gloucester,	Pluto.
Engstrom, Ernest T.,	Gloucester,	Thalia.
Enos, Antone,	Gloucester,	Catherine D. Enos.
Enos, Emanuel,	Gloucester,	Marina.
Enos, Manuel,	Gloucester,	Marian.
Enos, Manuel,	Provincetown,	(Power dory.)
Enos, William,	Gloucester,	Rita Viator.
Fellows, Charles,	Salem,	- -
Fewers, Edward,	Gloucester,	Azorian.
Firth, Lemuel,	Gloucester,	Cherokee.
Fisher, William J.,	Beverly,	Grace Darling.
Foley, Charles,	Newburyport,	(Dory.)
Foley, William,	Gloucester,	J. W. Bradley.
Forbes, Edward C.,	Boston,	Flavilla.
Forbes, Warren,	Gloucester,	Alice R. Lawson.
Fortado, M. P.,	Gloucester,	Rebecca Bartlett.

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Name.	Town.	Name of Vessel.
Fowler, Emery M.,	Salisbury,	(Dory.)
Fowler, Israel E.,	Salisbury,	(Dory.)
Fowler, James,	Duxbury,	Massasoit.
Fowler, John L.,	Newburyport,	(Dory.)
Fowler, Richard,	Salisbury,	(Dory.)
Fowler, William L.,	Salisbury,	(Dory.)
Francis, James,	Gloucester,	Sachem.
Francis, Joseph,	Provincetown,	Kate Maxwell.
Francis, Joseph,	Provincetown,	Glennelg.
Francis, M. J.,	Provincetown,	(Power dory.)
Francis, William,	Provincetown,	Minnie.
Frazier, James S.,	Boston,	Mattie D. Brundage.
Freeman, John E.,	Provincetown,	Milton.
Frost, Lorin,	Gloucester,	Pearl.
Frye, Abner,	Beverly,	Edna.
Frye, A. P., & Co.,	Salisbury,	(Dory.)
Gannon, James,	Boston,	Shenandoah.
Gauss, Charles,	Beverly,	(Dory.)
Gedrey, Benjamin J.,	Gloucester,	Mary A.
Gifford, Robinson,	Gloucester,	Conqueror.
Gillant, Gilbert,	Gloucester,	F. W. Homans.
Gillis, David,	Gloucester,	Maxwell.
Gitz, John,	Manchester,	(Dory.)
Gogetcher, Alex.,	Gloucester,	Almeida.
Gonvreau, Andrew,	Gloucester,	William H. Moody.
Goodwin, Benjamin,	Gloucester,	Braganza.
Goodwin, Gilbert,	Gloucester,	Gossip.
Goodwin, James,	Gloucester,	Agnes.
Goodwin, James A.,	Gloucester,	Edward A. Rich.
Goodwin, James D.,	Gloucester,	Ella G. Goodwin.
Goodwin, Jeremiah,	Boston,	Thos. Brundage.
Goodwin, Joseph A.,	Manchester,	Gardner Heath.
Gott, Chester W.,	Rockport,	Catherine.
Goulart, Antonio P.,	Boston,	Walter P. Goulart.

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Name.	Town.	Name of Vessel.
Gould, Roscoe H.,	West Chatham,	(Sail boat.)
Gould, Stephen W.,	South Chatham,	Asprel.
Gove, Robert F.,	Ipswich,	(Gasoline boat.)
Grady, Daniel,	Gloucester,	Speculator.
Graham, Joseph E.,	Boston,	Evelyn Smith.
Grant, Peter,	Gloucester,	Gracie.
Gray, John,	Gloucester,	Minnie.
Green, Alfred,	Gloucester,	Flirt.
Greenlow, Albert,	Gloucester,	Emerald.
Greer, Matthew,	Boston,	H. G. Martin.
Griffen, Albert J.,	Lanesville,	Alice.
Gross, George L.,	Gloucester,	Priscilla.
Gross, Melvin J.,	Gloucester,	Defender.
Groves, Edward,	Gloucester,	A. T. Gifford.
Guthrie, Martin,	Boston,	Alice W. Guthrie.
Hains, Alex,	Gloucester,	Meteor.
Hall, Augustus,	Gloucester,	Faustina.
Hall, Emery A.,	Ipswich,	(Gasoline boat.)
Hall, Frank,	Gloucester,	Ralph L. Hall.
Hamilton, John,	Duxbury,	Massachusetts.
Hamor, George,	Gloucester,	Corsair.
Hanson, Benjamin,	Gloucester,	On Time.
Hanson, Edward,	Gloucester,	Reliance.
Hanson, Sven,	Gloucester,	Sylvester.
Harding, James T.,	Boston,	Viking.
Harding, Thomas,	Gloucester,	Two Forty.
Harriden, George,	Lanesville,	(Sail dory.)
Harris, John T.,	Ipswich,	(Gasoline boat.)
Harty, Charles,	Gloucester,	Mary E. Harty.
Harvey, Isaac,	Essex,	(Gasoline boat.)
Hatch, Joseph,	Duxbury,	Mooween.
Hathaway, James,	Beverly,	(Gasoline boat.)
Haynes, John E.,	Ipswich,	(Gasoline boat.)
Heath, Edward,	Manchester,	(Sail boat.)

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Name.	Town.	Name of Vessel.
Hemeon, James W.,	Gloucester,	Mattacommet.
Henderson, Thomas P.,	Provincetown,	Jessie.
Hickey, John,	Boston,	F. J. O'Hara, Jr.
Hickman, Benjamin,	Salem,	– –
Hickman, George E.,	Gloucester,	Slade Gorton.
Higgins, James F.,	Brewster,	– –
Hilton, A. P.,	Newburyport,	(Gasoline boat.)
Hipson, Stetson,	Plymouth,	Mystery.
Hisks, H. L.,	Boston,	Bertha M. Bailey.
Hobert, Joseph,	Provincetown,	Vesta.
Hodgdon, Parkman,	Gloucester,	Robert C. Harris.
Hodsdon, Benjamin,	Gloucester,	Dixie.
Hodsdon, Lovell,	Gloucester,	(Gasoline dory.)
Hogizell, Albert,	Beverly,	(Dory.)
Holland, Edgar I.,	Ipswich,	(Gasoline boat.)
Holmes & Doten,	Plymouth,	Albertine.
Horton, Jeremiah,	Swampscott,	(Dory.)
Howard, Fred,	Beverly,	Boyd and Leeds.
Howes, Collins E.,	Chatham,	(Sail boat.)
Hoyt, Charles,	Newburyport,	(Gasoline boat.)
Hudder, Albert,	Gloucester,	A. M. Nicholson.
Hull, Fred R.,	Ipswich,	(Dory.)
Hull, Justin E.,	Ipswich,	(Gasoline boat.)
Hunt, F. E. & A. E.,	Salisbury,	(Gasoline boat.)
Hunter, Alexander,	Chatham,	– –
Inglestead, W. N.,	Green Harbor,	– –
Jacobs, Solomon,	Gloucester,	Veda M. McKown.
Jamison, Ed.,	Boston,	Mattie D. Brundage.
Jedrey, Frank,	Rockport,	Eddie Minot.
Jerault, E. C.,	Barnstable,	Charlie.
Jewell, Ned M.,	Ipswich,	(Gasoline boat.)
Jewett, James A.,	Gloucester,	Grace E. Freeman.
Jewett, Silas,	Gloucester,	Arrow.
Johnson, Alfred,	Gloucester,	Lelia E. Norwood.

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Name.	Town.	Name of Vessel.
Johnson, Benjamin,	Gloucester,	Lawrence Murdock.
Johnson, Edward,	Newburyport,	(Gasoline boat.)
Johnson, John,	Provincetown,	Barbara.
Johnson, J. R.,	Gloucester,	James S. Steele.
Johnson, Nicholas,	Gloucester,	Cecil H. Low.
Johnson, Peter J.,	Rockport,	City of Everett.
Jones, D. C.,	Manchester,	(Gasoline boat.)
Joseph, Frank,	Provincetown,	(Power dory.)
Joseph, S. A.,	Provincetown,	Angelenca.
Joseph, W.,	Provincetown,	(Power dory.)
Joyce, Rowell,	Gloucester,	Beulah Maud.
Keefe, John W.,	Gloucester,	Diana.
Kehoe, Wallace,	Swampscott,	(Dory.)
Kelly, Patrick H.,	Beverly,	(Dory.)
Kelley, Reuben O.,	Provincetown,	Georgie.
Kendrick, Albert F.,	Chathamport,	Lillian.
Kendrick, William,	Boston,	George E. Lane, Jr.
Kenney, Wallace,	Beverly,	Governor Cleaves.
Kent, Edward,	Ipswich,	(Dory.)
Kilburn, John,	Ipswich,	(Gasoline boat.)
Kimball, Charles H.,	Beverly,	Dorothy.
King, Joe,	Provincetown,	(Power dory.)
King, Walter,	Newburyport,	(Gasoline boat.)
Kingsley, Herbert, & Co.,	Salisbury,	(Dory.)
Kirk, John,	Marblehead,	(Gasoline boat.)
Krups, P.,	Marblehead,	(Dory.)
Lane, George & John,	Essex,	(Gasoline boat.)
Lane, Oscar,	Beverly,	Helen B. Lane.
Larkin, James H.,	Boston,	Onato.
Larkin, Murray,	Gloucester,	William H. Cross.
Larkin, William,	Beverly,	Jambouree.
Larkin, William B.,	Gloucester,	Sceptre.
Latimer, Gardner C.,	Newburyport,	(Dory.)
Lawson, Nels,	Gloucester,	Ella G. King.

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Name.	Town.	Name of Vessel.
Leonard, Matthew,	Boston,	T. H. Cronwell.
Lewis, Alex.,	New Bedford,	Laura E.
Lewis, Leonard,	Swampscott,	(Dory.)
Lewis, William B.,	Provincetown,	Reliance.
Livingston, Alex,	Provincetown,	(Dory.)
Lord, J. A.,	Ipswich,	(Gasoline boat.)
Lorentzen, Frank,	Gloucester,	E. A. Hooper.
Lovell, Herbert,	Yarmouth,	- -
Lowrie, John S.,	Gloucester,	Illinois.
Lubee, Morris,	Boston,	Geo. H. Lubee.
Lufkin, Henry C.,	Gloucester,	Esther Madelene.
Lunt, Clarence C.,	Newburyport,	(Gasoline boat.)
Luth, Christian,	Newport, R. I.,	On Time.
Luth, W. C.,	Newport, R. I.,	Olga.
Lyle, John,	Provincetown,	Gracie.
Lyle, Joseph A.,	Gloucester,	Nourmahal.
Lyons, W. H.,	Gloucester,	Wm. H. Ryder.
Mailman, William,	Gloucester,	Albert Geigher.
Malkis, Joe,	Provincetown,	(Power dory.)
Malone, Charles C.,	Gloucester,	Orinoco.
Marchant, Horace M.,	Lanesville,	(Sail dory.)
Marsh, Robert,	Swampscott,	(Dory.)
Martin, Benjamin,	Swampscott,	(Dory.)
Martin, Charles,	Gloucester,	N. A. Rowe.
Martin, John,	Gloucester,	Helena.
Mayo, Alfred A.,	Provincetown,	Iris.
Mayo, Herman L.,	Provincetown,	Little Jennie.
McComiskey, Asa,	Boston,	Alcina.
McComiskey, T. W.,	Boston,	Catherine D. Burke.
McDonald, Daniel J.,	Duxbury,	Squanto.
McDonald, James,	Gloucester,	Edwin B. Holmes.
McDonald, John,	Boston,	Grace W. Hone.
McEachen, Alex.,	Gloucester,	Maggie and May.
McFarland, John,	Gloucester,	Mary E. Webb.

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Name.	Town.	Name of Vessel.
McGrath, Laurence,	Gloucester,	Hobo.
McGray, Benjamin F.,	Gloucester,	Norma.
McHenry, James,	Gloucester,	Theodore Roosevelt.
McInnis, John,	Gloucester,	Aloha.
McKay, James,	Gloucester,	- -
McKenney, Herbert T.,	Ipswich,	(Gasoline boat.)
McKinnon, John A.,	Gloucester,	Norumbega.
McLain, George E.,	Rockport,	Atlantic.
McLean, Albert,	Marblehead,	(Gasoline boat.)
McLoud, Alex.,	Gloucester,	Leander F. Gould.
McLoud, Simeon,	Gloucester,	Northern Eagle.
McNeil, Roderick,	Gloucester,	Senator Salisbury.
McPhee, Neil S.,	Gloucester,	Louisa Polleys.
Merchant, Fred,	Salem,	Evangeline.
Mesquita, Joseph,	Gloucester,	Francis P. Mesquita.
Miller, Mark, & Co.,	Salisbury,	(Dory.)
Milton, Manifred,	Newburyport,	(Dory.)
Mitting, Theodore,	Newburyport,	(Dory.)
Morgan, George B.,	Lanesville,	Star Spangled Banner.
Morris, Edward,	Gloucester,	Miranda.
Morrissey, William F.,	Gloucester,	Helen F. Whitten.
Morse, Bartholomew,	Beverly,	(Gasoline boat.)
Morse, George F.,	Newburyport,	(Gasoline boat.)
Mosoetic, John,	Gloucester,	Nettie.
Murray, Thomas F.,	Gloucester,	Mary A. Gleason.
Nauss, Robert,	Gloucester,	Lizzie M. Stanley.
Neil, Valentine D.,	East Boston,	Elmer E. Gray.
Nelson, Charles,	Gloucester,	Mary Emerson.
Nelson, Hans,	Gloucester,	Lorna Doone.
Nelson, Henry,	Gloucester,	(Trap.)
Nelson, John,	Gloucester,	Reliance.
Nelson, Niles,	East Brewster,	(Seven dories.)
Newell, W.,	Gloucester,	Vesta.
Newhall, W. H.,	Gloucester,	Canopus.

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Name.	Town.	Name of Vessel.
Nickerson, C. E.,	Gloucester,	Maud M. Story.
Nickerson, Eldridge,	Boston,	Ellen C. Burke.
Nickerson, Eldridge C.,	Boston,	Quannapowitt.
Nickerson, Enos,	Boston,	Seaconnet.
Nickerson, Erastus,	Boston,	Bertha M. Bailey.
Nickerson, Herbert,	Malden,	Buema.
Nickerson, H. F. & E. K.,	South Chatham,	Corsair.
Nickerson, Jethu W.,	Boston,	Flora S. Nickerson.
Nickerson, Josiah,	Swampscott,	(Dory.)
Nickerson, Phillip L.,	Harwichport,	(Sail boat.)
Nolan, Frank,	Gloucester,	Actor.
Norris, Larance,	Boston,	Mary A. Whalen.
Norwood, John H.,	Gloucester,	(Boat 20 feet.)
Obed, William J.,	Boston,	Catherine G. Howard.
O'Brien, John,	Boston,	Mattakesett.
Olson, Lars,	Gloucester,	Julietta.
O'Neal, George R.,	Provincetown,	Lucy B. Winsor
O'Neil, Charles,	Gloucester,	Valentina.
O'Neill, Dennis,	East Boston,	Fanny E. Prescott.
Pail, Joe,	Provincetown,	(Power dory.)
Parks, George M.,	Gloucester,	Thistle.
Parsons, Samuel,	Rockport,	Queen of the Sea.
Paul, Antone,	Provincetown,	(Power dory.)
Paul, Frank,	Provincetown,	(Power dory.)
Paul, George,	Salisbury,	(Gasoline boat.)
Paulsen, Gussie,	Provincetown,	Perseverance.
Peabody, William,	Salem,	(Dory.)
Pennington, A. H.,	Gloucester,	Motor.
Pennur, Austin,	Boston,	A. C. Newhall.
Peoples, George,	Gloucester,	Lafayette.
Perry, George H.,	Boston,	Teresa and Alice.
Perry, Manuell F., 2d,	Gloucester,	Two Sisters.
Perry, Marian,	Provincetown,	Annie Perry.
Peterson, Edward,	Boston,	Elsie Rowe.

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Name.	Town.	Name of Vessel.
Peterson, Gustaf,	Gloucester,	Corona.
Peterson, Henry,	Gloucester,	Maud B. Murray.
Pettipas, Joseph,	Boston,	Nokomis.
Phillips, Edward C.,	Swampscott,	(Dory.)
Phillips, Henry,	Green Harbor,	– –
Phillips, William B.,	Swampscott,	Pioneer.
Pierce, James L.,	Marblehead,	(Dory.)
Pierce, John,	Marblehead,	(Dory.)
Pierce, John D.,	Marblehead,	(Dory.)
Pierce, Nathaniel,	Swampscott,	(Dory.)
Pierce, Richard,	Newburyport,	(Gasoline boat.)
Pierce, William,	Salisbury,	(Dory.)
Pike, Gustavlus,	Newburyport,	(Dory.)
Poor, Harold C.,	Ipswich,	(Gasoline boat.)
Porper, Robert B.,	Gloucester,	Cavalier.
Post, John,	Ipswich,	(Gasoline boat.)
Potter, Charles,	Boston,	Sarah C. Wharf.
Powers, Michael,	Boston,	Benjamin F. Phillips.
Price, William,	Duxbury,	Manomet.
Prior, Elroy,	Gloucester,	Kentucky.
Proctor, Edward A.,	Salem,	Florida.
Proctor, James,	Plymouth,	Minerva.
Publicover, E.,	Boston,	Gertrude.
Quinlan, Hugh,	Duxbury,	Mooanam.
Radcliff, Amos N.,	Swampscott,	Venus.
Real, Chauncey,	Salem,	(Dory.)
Rhodes, Peter,	Ipswich,	(Dory.)
Rich, Edward S.,	Salisbury,	(Gasoline boat.)
Rich, Henry,	Newburyport,	(Gasoline boat.)
Riley, Alfred W.,	Lanesville,	(Gasoline dory.)
Robbins, John F.,	Duxbury,	Matamora.
Roberts, Isaiah,	Gloucester,	Electric.
Roberts, Walter,	Salem,	Venus.
Roberts, Wilfred,	Boston,	Susan and May.

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Name.	Town.	Name of Vessel.
Robinson, Robert,	Gloucester,	Jack O'Lantern.
Rogers, Ensign,	Dennis,	L. Ellouse.
Rogers, Frank V.,	Boston,	Hattie F. Knowlton.
Rose, Charles F.,	Gloucester,	J. F. McMorrow.
Rose, Edward,	Lanesville,	(Gasoline dory.)
Rose, Emanuel J.,	Gloucester,	Laura Enos.
Ryder, Albert G.,	West Chatham,	Searey.
Sampson, James R.,	Plymouth,	Rose Standish.
Sanger, Antone, 2d,	Provincetown,	(Power dory.)
Santos, Frank,	Provincetown,	(Power dory.)
Santos, Joe,	Provincetown,	(Power dory.)
Santos, Manuel D.,	Provincetown,	(Power dory.)
Santos, Manuel,	Provincetown,	Mary C. Santos.
Sants, John,	Provincetown,	(Power dory.)
Sater, John,	New Bedford,	Viking.
Sattime, Charles F.,	Newburyport,	Neptune.
Scase, Joseph,	Gloucester,	Oliver Sears.
Scuola, Giovanni,	Boston,	Sea Foam.
Sears, Frank I.,	Provincetown,	Dart.
Sears, Joseph, Sr.,	Provincetown,	(Sail dory.)
Sears, J. W.,	Provincetown,	-
Seartz, John R.,	Provincetown,	Climax.
Seaton, Jule,	Provincetown,	(Power dory.)
Seeley, Elias,	Beverly,	Lydia.
Selig, Adam A.,	Gloucester,	Titania.
Selig, Edward,	Gloucester,	Estelle Nunan.
Selig, William J.,	Boston,	Emma W. Brown.
Shea, Jeremiah,	Boston,	Regina.
Shea, P. T.,	Gloucester,	Colonial.
Sherman, Charles,	Newburyport,	(Dory.)
Short, George G.,	Newburyport,	Joppaite.
Short, George G.,	Newburyport,	(Gasoline boat.)
Silva, Antone,	Provincetown,	Lewis Warren.
Silva, Antone C.,	Provincetown,	M. L. Adams.

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Name.	Town.	Name of Vessel.
Silva, Henry P.,	Provincetown,	Dido.
Silva, John,	Provincetown,	J. P. Johnson.
Silva, John, 2d,	Rockport,	Maud F. Silva.
Silva, John F.,	Provincetown,	Magnolia.
Silva, Joseph,	Boston,	Ida M. Silva.
Silva, Joseph S.,	Provincetown,	Louisa R. Sylva.
Silva, Jule Fratus,	Provincetown,	(Power dory.)
Silva, Manuel,	Provincetown,	Columbia.
Silvata, John J.,	Boston,	Evelyn L. Smith.
Silveira, James,	Boston,	Mary C. Silveira.
Silvera, Joaquin J.,	Boston,	Flora J. Sears.
Slade, Joseph,	Manchester,	(Dory.)
Sloan, William,	Gloucester,	A. D. Story.
Small, John,	Ipswich,	(Gasoline boat.)
Small, John,	Provincetown,	(Power dory.)
Small, Samuel S.,	Ipswich (Grape Island),	(Gasoline boat.)
Smith, Charles H.,	Gloucester,	Nautilus.
Smith, Elmer,	Ipswich,	(Gasoline boat.)
Smith, George,	Gloucester,	Fannie A. Smith.
Smith, James,	Gloucester,	Torpedo.
Smith, Joseph,	Gloucester,	Bertha and Pearl.
Smith, Nathaniel P.,	Gloucester,	Margie Smith.
Smith, William,	Newport, R. I.,	Gypsy Maid.
Somers, Miles,	Gloucester,	Preceptor.
Sousa, Antonio K.,	Provincetown,	P. P. Manta.
Souther, George M.,	Newburyport,	(Dory.)
Southwick, Nicholas,	Beverly,	(Dory.)
Sperry, James W.,	Gloucester,	Fly.
Spinney, Adolphus,	Gloucester,	Orpheus.
Spinney, F. M.,	Gloucester,	Senator.
Spinney, Lemuel E.,	Gloucester,	American.
Spinney, M.,	Gloucester,	Blue Jacket.
Spinney, Wilson,	Gloucester,	Arbitrator.
Stanley, Ed.,	Beverly,	Viola.

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Name.	Town.	Name of Vessel.
Stanley, Joshua W.,	Boston,	Elizabeth Silsbee.
Steele, George F.,	Gloucester,	Selena.
Stevens, William,	Newburyport,	(Gasoline boat.)
Stoddard, William,	Boston,	Fame.
Stone, Silas,	Ipswich,	(Dory.)
Story, Albert,	Rockport,	(Trap.)
Stover, Woodbury P.,	Beverly,	Frank Munroe.
Stream, Frank,	Gloucester,	Waldo L. Stream.
Stream, John G.,	Gloucester,	Kineo.
Sweat, Manuel,	Provincetown,	- -
Swenson, August,	Gloucester,	Niagara.
Swift, Bob,	Plymouth,	- -
Swim, Benjamin,	Boston,	Hope.
Tallgrew, Peter T.,	Duxbury,	Tecumseh.
Tarr, Frank A.,	Gloucester,	Myrtle.
Tarr, George H.,	Rockport,	Lena May.
Tarvers, Antone,	Provincetown,	(Power dory.)
Thing, Ernest,	Swampscott,	(Dory.)
Thomas, Jeffrey,	Gloucester,	Arcadia.
Thomas, William H.,	Gloucester,	Thomas L. Gorton.
Thomas, W. R.,	Plymouth,	Allons.
Thompson, John,	Boston,	Mary Edith.
Thompson, John W.,	Gloucester,	Carrie E.
Thurlow, George,	Newburyport,	(Dory.)
Thurlow, George F.,	Newburyport,	(Dory.)
Thurlow, James H.,	Newburyport,	(Dory.)
Thurlow, Joseph,	Newburyport,	(Dory.)
Thurlow, Nestor,	Newburyport,	(Dory.)
Thurlow, Sydney,	Newburyport,	(Gasoline boat.)
Tobin, Richard,	Boston,	Margaret Dillon.
Tolman, W. H.,	Green Harbor,	- -
Turner, George,	Gloucester,	Blanche Irving.
Tutt, William,	Marblehead,	(Dory.)
Tyler, Isaac J.,	Provincetown,	I. Tyler.

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Name.	Town.	Name of Vessel.
Vale, Patsy,	Gloucester,	Pauline.
Valyoke, Peter,	Provincetown,	(Sail dory.)
Vera, Manuel P.,	Provincetown,	Ira P. Hatch.
Viator, Fortune,	Beverly,	Oliver Kilham.
Viator, Manuel F.,	Gloucester,	Mary E. Stone.
Wareham, William M.,	Provincetown,	Rattler.
Warren, Jed,	Gloucester,	Richard Lester.
Watts, Frederick,	Swampscott,	(Dory.)
Webber, Ralph,	Gloucester,	Marguerite.
Weeks, E. O.,	Provincetown,	Sylvia.
Weeks, Joseph E.,	Provincetown,	Grace Darling.
Welch, Martin,	Gloucester,	Lucania.
Wells, Edward E.,	Ipswich,	(Gasoline boat.)
West, John,	Manchester,	(Dory.)
Wetcel, Frank,	Lanesville,	Fussy.
Whalen, Maurice,	Gloucester,	Vera.
Whelden, Edna A.,	Provincetown,	(Sail dory.)
White, Antonio,	Provincetown,	William A. Morse.
White, Charles,	Gloucester,	Joseph W. Lufkin.
Whitten, Owen,	Gloucester,	Ralph Russel.
Whitney, Walter,	Gloucester,	Agnes V. Gleason.
Whorf, H. S.,	Provincetown,	Daniel Boone.
Wildes, Lyman,	Gloucester,	Olga.
Wiley, Freeman,	Gloucester,	Messenger.
Wilkie, Henry M.,	Gloucester,	Columbia.
Wilkie, James,	Newburyport,	(Gasoline boat.)
Willett, Peter A.,	Gloucester,	Freedom.
William, John,	Provincetown,	(Power dory.)
Williams, Bernard A.,	Gloucester,	John S. Presson.
Williams, John C.,	Gloucester,	Norman Fisher.
Winkpaw, Alden,	Gloucester,	Little Fannie.
Wolfe, Fred,	Boston,	Priscilla.
Wolfe, William J.,	Provincetown,	H. M. Young.
Woodman, George F.,	Newburyport,	(Gasoline boat.)

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Name.	Town.	Name of Vessel.
Woodbury, Elbridge,	Lanesville,	Charles A. Dyer.
Woodbury, John J.,	Lanesville,	(Power dory.)
Woods, John P.,	Provincetown,	Handy Andy.
Woods, Stephen,	Provincetown,	(Power dory.)
Woodward, H. F.,	Salisbury,	(Dory.)
Wright, William,	Newburyport,	(Gasoline boat.)
Wylde, Horace,	Gloucester,	Dictator.
Yates, Charles A.,	Newport, R. I.,	Olive E.
Young, Fred,	Brewster,	(Two dories.)
Young, J. E.,	South Chatham,	Mayflower.

Returns were received from the following localities, and they include all the various types of sea fisheries carried on from Massachusetts territory: —

Barnstable,	1	Lanesville,	10
Beverly,	20	Malden,	1
Boston,	63	Manchester,	8
Brant Rock,	1	Marblehead,	11
Brewster,	3	New Bedford,	3
Chatham,	3	Newburyport,	43
Chathamport,	1	Newport, R. I.,	5
Dennis,	1	Provincetown,	82
Duxbury,	8	Plymouth,	6
East Boston,	2	Rockport,	19
East Brewster,	4	Salem,	7
East Dennis,	1	Salisbury,	12
Essex	6	South Chatham,	6
Gloucester,	195	Swampscott,	21
Green Harbor,	4	West Chatham,	2
Harwichport,	2	Yarmouth,	1
Ipswich,	29		

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Under the head of "Remarks," in the replies to the circular, the following are fair examples of the various opinions expressed by the fishermen: —

It is almost impossible to fish with trawls or nets in Ipswich or Massachusetts bays during the summer months, on account of dogfish. (Elbridge Woodbury, Lanesville, schooner "Charles A. Dyer.")

Have not been able to fish for food fish other than lobsters during the past five years during the summer months. Catch dogfish in lobster pots occasionally. (Albert J. Griffin, Lanesville, gasoline dory "Alice," 2 men.)

Have been fishing for dogfish off and on for about two or three years, and could not make a success. (George Harriden, Lanesville, sail dory, 1 man.)

We could not fish with any success in June and July with trawls, or hand line in August, dogfish were so plenty. Tried to set out trawls about two weeks ago, and got dogfish on every other hook, and had to give up. (Frank Wetcel, Lanesville, sloop "Fussy," 1 to 3 men.)

In August, 1904, we went fishing expressly for dogfish; we were gone three weeks, and secured 60 barrels of livers, realizing $180 for same, and shared $30 each. It was hard work, and the dogfish were extra large in size, — about 17 to a bucket of livers. It hardly paid us, as the expense was very much, and if the dogfish were of average size or smaller, we would have had a lot of hard work with little pay. In 1902 we went over to Ipswich River after herring, and dogfish were so plenty they destroyed our nets. Dogfish were never known to be found in this river before, to my knowledge. They come earlier each year. (Benjamin Bowden, Lanesville, schooner "Venus," 4 to 6 men.)

We go south netting mackerel every spring in April, and sometimes we strike dogfish as soon as we get on the fishing grounds, we always find them soon after; and from then until we return to Gloucester, which is usually about July 1, they are a constant pest. They eat our fish and destroy our nets, and we lose a great amount of time on account of them. They are so plenty in Massachusetts Bay during the summer months that we cannot pursue any fishing except sword-fishing, which we go at until about September 15. Then we go hand-lining for pollock, and are annoyed constantly until November 1, and sometimes later. (John W. Keefe, Gloucester, sloop "Diana," 6 to 8 men.)

Go hand-lining on Georges all the year. From May until November dogfish are such a pest that we are constantly going from one end of the fishing grounds to the other to get clear of them. They are constantly increasing, and getting more of a pest each year. (Samuel Crittenden, Gloucester, schooner "Mattie Winship," 13 men.)

Go south every spring netting mackerel, and have to contend with dogfish constantly. Cannot fish for mackerel with nets in Massachusetts Bay during summer months, as dogfish are so numerous. (Robert Robinson, Gloucester, sloop "Jack-O'Lantern," 3 men.)

We fish on the "Rips," and dogfish are very plenty there; if we used any bait other than cockles, we could not fish. The past year dogfish are eating cockles more than I ever saw them before, and we

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caught more. We start pollocking about September 20, and dogfish eat at least one-half our bait, and drive us from the grounds at times. (Benjamin Goodwin, Gloucester, schooner "Braganza," 17 men.)

Started Sept. 10, 1905, to fish for pollock on Jeffrey's. Dogfish were so numerous that if it had not been for another vessel in the vicinity we would have had to return without any fish, as the dogfish ate our hooks off our lines. We had a good supply of hooks. By getting hooks from our neighbor we managed to catch fish enough to pay our expenses. Although we have done fairly well to date, the dogfish have been an awful pest to us, and are more numerous this fall than I ever saw them. (Norman Devine, Gloucester, schooner "James A. Garfield," 14 men.)

Sometimes when we are setting our trawls we feel the dogfish biting and haul right back to save the gear, and we lose that day's fishing. (Joseph P. Mesquita, Gloucester, "Frances P. Mesquita.")

Dogfish are constantly increasing, and when there are any mackerel in Massachusetts Bay it is almost impossible to catch them and save them without losing a large quantity. They come earlier and stay later each year. (Alex McLoud, Gloucester, schooner "Leander F. Gould," 14 to 17 men.)

About April 10 the past few years dogfish make their appearance on the grounds where we fish, and are a constant pest to us more or less until January 1. They eat our bait, and sometimes before we can get many food fish our supply of bait is gone, and we have to return with a small fare. They seem to be getting more numerous each year. (William Sloan, Gloucester, schooner "Arthur D. Story," 15 men.)

We have to go farther to the eastward each year, to get clear of dogfish. When we first went to the eastward there were none there, but the last few years they are getting as plenty there as elsewhere. (James D. Goodwin, Gloucester, schooner "Ella G. Goodwin," 22 men.)

Have been fishing about Massachusetts Bay for thirty years, and dogfish seem to be getting more numerous each year. They come earlier and stay later each season. In a few years there will be no food fish, if they continue to constantly increase. (George L. Gross, Gloucester, schooner "Priscilla," 16 men.)

Go seining each year, and have always caught more or less dogfish with mackerel, except this year, 1905. I believe there are more dogfish than ever before, although we have had the good fortune to escape them. A few years ago we had about 100 barrels of mackerel in our seine, and before our vessel got to us the dogfish attacked the fish on the outside and ate the twine, so they all escaped but 5 barrels. Our seine was greatly damaged, so we had to give up the trip and return and get it repaired, at an expense of $300. (Joseph Smith, Gloucester, schooner "Bertha and Pearl," 18 men.)

In the years 1899–1901 our floating trap was set at the Breakers, Marblehead. We would get a few dogfish, and they caused serious loss to us of food and bait for fish, besides damaging our trap. Their presence about a trap will keep all other fish away, and when any small fish are meshed in our leader of trap, dogfish will eat them and the twine also. (Thomas Douglass, Gloucester.)

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In the year 1903, during the months of June, July and August, dogfish struck in, and our floating traps were filled with them on 20 occasions; we were bothered in fishing and our traps were damaged very much. In 1904 it was the same. This year we have only caught a few, as they have not come close enough to the shore. Their presence keeps all other fish from the shore, and when they are about it is impossible to catch other fish. (Frank A. Tarr, Gloucester, gasoline boat "Myrtle," 3 men.)

We usually fish with cockles, and dogfish do not like them very well. One trip we could not get cockles on our second baiting, so we took herring. Codfish were quite plenty when the dogfish struck, and after making about 200 attempts we had to come home, as our bait was all eaten by dogfish. (W. H. Lyons, Gloucester, schooner "Wm. H. Ryder," 16 men.)

Usually find dogfish about the first of May off New York, and then all along the Massachusetts coast during the summer months. The more mackerel there are, the more dogfish. (Albert Hudder, Gloucester, schooner "A. M. Nicholson," 18 men.)

Dogfish have possession of the Massachusetts coast in summer months. After returning from the southern mackerel fishery, July 1, I had to haul up for two months. Started hand-lining about September 1, and have not been very successful yet, as dogfish are quite numerous, and have driven us around the grounds. The last trip we made 4 berths and returned with very few fish. (Robert B. Benham, Gloucester, schooner "Lizzie W. Hunt," 4 men.)

Left Gloucester for southern mackerel fishery (which means to southward of Cape Cod) on April 22, 1905. Set our nets about May 1, off Jersey coast; dogfish so plenty we could do no fishing for a week. Fished off Fire Island from 10 to 30 miles, and did very well, although we were bothered a great deal. On June 1 fished off Noman's Land, and dogfish and sharks were very destructive to our nets. Have examined some of the contents of dogfish stomachs, and found it to be mackerel. In September, 1904, we set 60 nets off Thatcher's Island, 5 miles, at 6 P.M.; good prospects for mackerel. Dogfish struck at 7 P.M. Twenty hours getting our nets on board boats. Nets mended during leisure time in winter; used 36 twine, $12; patches, $12; damage, $350, if hired done. (John F. Barrett, Gloucester, schooner "Lillian," 7 to 10 men.)

We are bothered more or less with dogfish, and at times during the summer we have hard work to save mackerel that we have in our seine, as the dogfish attack them from the outside, and liberate them at times in large numbers. When we start trawling in the early fall we are annoyed by them very much. They are not getting any scarcer each year. (Thomas Downie, Gloucester, schooner "Monarch," 20 men.)

On 20 occasions we have set our trawls and the bait has been eaten by small dogfish, which were hardly large enough to get on our hooks. On one occasion not a food fish was captured, — something which has never been known before. (Freeman Wiley, Gloucester, sloop "Messenger," 2 to 4 men.)

I have been fishing the past years to the eastward of Cape Sable, and never saw any dogfish to speak of until about two years ago, and

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they have been quite plenty at times during the last two seasons. This fall we were getting fair fishing and catching some squid every night to use for bait, when dogfish appeared, driving away the squid. We were forced to go to Nova Scotia for bait, and we could not get any. We had to return home with a small fare. (Adolphus Spinney, Gloucester, "Orpheus," 18 men.)

We fish for mackerel in the spring and during the summer, and dogfish are an awful pest to us. Last summer, 1905, we had a school of mackerel in our seine, and as it was calm the vessel was a long while getting to us, and dogfish attacked our seine and liberated the mackerel, valued at $2,000, besides doing about $125 damage to our seine. When we start trawling in the fall we are bothered more or less with them. Only last trip we set our trawls (about 40,000 hooks) and got a dogfish on nearly every hook, or the bait was gone. (Martin Welch, Gloucester, "Lucania," 23 men.)

We fish with hand lines on Georges, Browns, La Have, Western banks and Scatterie. Dogfish are getting more numerous each year. In the fall they drive the squid from the bank, and prevent us from getting trips as we used to a few years ago. (James McDonald, Gloucester, "Edwin B. Holmes," 13 men.)

In the month of June, 1905, we were fishing with cod nets in Ipswich Bay, and getting a fair catch of codfish each day. Dogfish struck, and we were forced to abandon the fishing. It is almost impossible to fish in Massachusetts Bay during the summer months. (Charles H. Smith, Gloucester, "Nautilus," 3 to 4 men.)

In the month of September, 1903, we set 45 mackerel nets at 6 P.M., about 8 miles east from Thatcher's Island. Dogfish struck at 7 P.M. We began to haul back the nets, and got our nets on board and free from dogfish at 10 A.M. the next day. Damage estimated at $2 per net, 50 mackerel saved. The dogfish were very small, and weighed about 1 pound each. In the year 1904, in the months of July and August, similar conditions existed. This year, 1905, have not dared to take a chance to fish for mackerel with nets, and have been sword-fishing. (Sven Hanson, Gloucester, "Sylvester," 4 to 5 men.)

We fish on Scatterie, Quero, Western banks, Grand Banks, and dogfish seem to be on the increase each year. They do considerable damage to our fishing gear, and at times we lose a great amount of time on account of them. I believe the presence of dogfish on the fishing grounds the past few years has kept us from getting our regular supply of squid on our fall trips. We left the banks November 23, and they were quite numerous then. (Warren Forbes, Gloucester, "Alice R. Lawson," 18 men.)

Dogfish are getting more numerous each year, and we have to go farther to the northward and eastward to get clear of them. A few years ago we hardly knew what it was to catch dogfish on the Banks where we fished. When they are present we can't get any squid. (William F. Morrissey, Gloucester, "Helen F. Whitten," 18 men.)

Generally find them off Jersey coast about May 1, and then they are a pest to us all summer, and have been the past ten years. (Solomon Jacobs, Gloucester, "Veda M. McKnoven," 20 men.)

Almost impossible to set cod nets or mackerel nets in Massachusetts

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or Ipswich bays after first of June, and has been the past five years. They eat bait and hooks off hand lines as fast as you can put them on, in the fall, when they are about to any extent. (James A. Jewett, Gloucester, schooner "Grace E. Freeman," 4 to 6 men.)

Have tried to drag for mackerel this summer on 6 occasions. No mackerel, and plenty of dogfish. Had to quit, on account of dogfish. The last time, July 20, our nets were in the water only one hour, and after hauling them on board of boat it required ten hours to overhaul nets and pick out the dogfish. Same the past five years in Massachusetts and Ipswich bays. (George M. Parks, Gloucester, sloop "Thistle," 3 men.)

Start for southern mackerel fishery with nets about April 15 to 20 each year, and usually find dogfish May 1 off Jersey coast, and from then until we return to Gloucester we have to try and dodge them all along the coast. They are getting more numerous each year. Return about July 1, and go hand-line fishing until December 1 to 25. The dogfish are a pest, and do not leave until about November 1. This year this month [September] they are driving us all over fishing grounds daily. (James W. Hemeon, Gloucester, schooner "Mattacomet," 10 men.)

We go netting codfish until dogfish strike, which usually is in May or June. Then we have to get out of it, as the dogfish seem to be everywhere along our coast. Five or ten years ago we could dodge them, and sometimes they would stay on the shore a week or so, and then move on. Of late years they seem to have come to stay during the months of May, June, July, August and September. (Henry C. Lufkin, Gloucester, sloop "Esther Madelene," 3 men.)

We hand line on Georges, Browns and La Have banks all the year. We get dogfish about April 1, and all through the summer and fall until January. They cause us lots of trouble, as we are driven all over the fishing grounds by them, losing a great amount of time, and, as they eat a large amount of our bait, quite often our supply runs short, and we have to return with small fares. (Andrew Gonvreau, Gloucester, schooner "Wm. H. Moody," 15 men.)

We start for the southern mackerel fishery about April 15 to 20, and about May 1 we most always are attacked by dogfish. They chase the fish, and it is hard work to keep clear from them. We return to Gloucester about July 1, and, as dogfish are numerous in Massachusetts Bay during the summer months, we can't fish with our nets. Last spring we had the webs of 30 new nets valued at $180, completely eaten up. After September 15 we go hand lining for pollock, and dogfish are quite plenty until November 1, and sometimes later. They eat at least one-half of our bait, and are a constant pest. (George Peoples, Gloucester, schooner "Lafayette," 7 to 10 men.)

We have not been bothered the past two years with dogfish as much as we have been previously. We go a trip sword-fishing during the dogfish season; we have caught a great many more food fish this summer than ever before, and prices have ruled lower. We made a set off Highlands in June this year, and our trawls were attacked by dogfish; we estimate that 20,000 pounds of food fish were destroyed. (Thomas F. Murray, Gloucester, schooner "Mary A. Gleason," 14 men.)

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We always made a good season's work with our floating trap up to five years ago; since that time we can't make a living. Mackerel and bait do not seem to come in shore as usual. I believe that the school of dogfish which has been so constant and numerous in our bay the past five years has kept the food fish away. (George W. Douglass, Gloucester, schooner "Mary Elizabeth," 3 men.)

Bait very scarce, so did very little fishing this summer, 1905. Same in 1904. In July, August and September, 1903, made several attempts to fish in the bay, but had to give up on account of dogfish. (John J. Woodbury, Gloucester, Lanesville, large power dory, 1 to 2 men.)

We usually find dogfish about June 1, off Block Island. They follow the mackerel up along the channel into Boston Bay, and in July Massachusetts Bay is full of dogfish. They harass the mackerel, and it is almost impossible to catch a large school and get them on board without suffering great damage and loss of fish when dogfish are about. It is an ordinary affair to have dogfish attack a seine and liberate two or three thousand dollars' worth of fish, when dogfish are numerous. (Frank Hall, Gloucester, schooner "Ralph L. Hall," 19 men.)

We find dogfish mixed with mackerel as soon as we get on the southern fishing grounds each year, and they are a menace to us all the season. There is not so much danger from them inside the seine as there is on the outside. Our seine has often been attacked by dogfish from the outside, and we have lost a great many fish. (Joseph A. Lyle, Gloucester, "Norumahal," 18 men.)

I have been fishing off Eastern Point the past twenty years, and dogfish have got so numerous the past few years that it is almost impossible to earn anything during the summer months. Up to a few years ago we could earn from $400 to $500 a season, but the past few years it has been much less, so that I shall have to give up fishing and work on shore. (John H. Norwood, Gloucester, boat 20 feet long, 1 man.)

On Sept. 12, 1905, we were fishing on Western Jeffreys. We were getting fair fishing when dogfish struck, and after making 3 or 4 berths of about a mile each we were forced to give up and return to port. (John Mosoetic, Gloucester, "Nettie," 3 to 4 men.)

On June 10, 1904, we set 40 mackerel nets at 7 P.M. In half an hour the dogfish struck, and we started to haul our nets, and got them on board at 9 A.M. the next day. Time consumed, 14 hours; time lost in repairing, 4 days; damage estimated, $100. Location, 5 miles east of Noman's Land. (Capt. Benj. Hanson, Gloucester, "On Time," 4 to 5 men.)

We fish for halibut and other fish on banks to eastward of Cape Sable from March until September. Dogfish were hardly known to us up to three years ago, and since then they have been becoming more numerous each season, until now they are a pest, and we lose a lot of time, fishing gear and food fish by their presence. In September we start to fish for haddock, cod and other food fish and we have been fishing from Jeffrey's to Liverpool, N. S. There are more dogfish this fall than I ever saw. On this trip off Jeffrey's, December 1, we could not fish for them, and a few days later farther to the eastward we caught at least 40,000. On one day our gear contained food-

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fish heads enough to estimate loss at $500, together with $25 damage to trawls. (Capt. F. M. Spinney, Gloucester, "Senator," 20 men.)

We get dogfish mixed with mackerel in the spring off New York in May, and continue to do so all the season until October. They are a great menace, and are getting worse all the time. Sometimes they attack our seine from the outside when we have a good haul of fish, and chew the twine and liberate them. (George Hamor, Gloucester, "Corsair," 18 to 19 men.)

Last summer we lost at least 20 tubs of trawls on account of dogfish. During the summer season we catch as many dogfish as we do food fish. Sometimes, after making a small trip on account of dogfish being so numerous, the crew get discouraged, and we have to wait to get a crew; if a bounty was paid, it would relieve this. (Charles C. Malone, Gloucester, "Orinoco," 22 men.)

Last fall dogfish attacked the herring in our nets, and destroyed both the fish and nets. When we arrive off New York where we fish for mackerel we usually find more or less dogfish, and continue to do so all the season; and during the summer it has been almost impossible to fish with nets the past few years in Massachusetts Bay. This fall to date we have been fishing around Block Island, and have seen more dogfish the past two months than I ever saw at any time in my experience. (Silas Jewett, Gloucester, schooner "Arrow," 10 men.)

For the past few years we have had to go farther to the eastward each year during the summer and fall to get clear of the dogfish, as they have been so numerous on the regular grounds that it is impossible to fish at times. This year we found them numerous on Flemish Cap, the first time I ever saw any there. They are the worst pest that the fishermen have to contend with. (Lemuel E. Spinney, Gloucester, schooner "American," 20 men.)

We start for southern mackerel fishery with nets in the spring, and usually find dogfish off New York; and from the time we first find them it is hard work to keep clear from them during the season. If we are fortunate enough to do so, we always make a good trip. About September 10 we start hand lining, and they are very numerous, and seem to be more so each year. Two years ago we were fishing with 50 nets, and had taken 1,400 mackerel from 15 nets, when dogfish struck, and all the fish in the remaining nets were destroyed, together with the nets. The fish sold for 18 cents each. (Gilbert Gillant, Gloucester, schooner "F. W. Homans," 14 to 16 men.)

We are bothered more or less with dogfish from spring until fall. We are always in dread of them, as they do considerable damage to our seines. The part we fear the most is the attack from the outside after we have caught the mackerel in our seine, as we often have a school of great value. (Charles Harty, Gloucester, "Mary E. Harty," 19 men.)

Up to a few years ago dogfish were not found to any extent on Flemish Cap or the Grand Banks, but the past two years they have been a terrible pest, especially on Grand Banks. Have been jigging squid for bait, when dogfish would appear and drive them away. This is a great detriment, as we depend on squid mostly for bait, and since dogfish have appeared on the banks we can't get squid as we used to. (Capt. Alex Hains, Gloucester, "Meteor," 18 men.)

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We fish on Grand Bank, Quero, Green St. Peter's, Sable Island and La Have banks, and a few years ago we never were bothered with dogfish; now they are so numerous that we have to go farther each year to get clear of them. This trip on Scatterie Bank there were good prospects for fish, as we were jigging squid for bait and getting fair fishing. Dogfish struck, drove the squid, and after making several attempts to find a place where they were not, we had to return with only a partial fare of food fish. (Roderick McNeil, Gloucester, "Senator Salisbury," 16 to 18 men.)

Always fished to eastward of Cape Sable, and never saw any dogfish to amount to much until a few years ago. This year was the worst I ever saw. The last day we fished we set 21 tubs of trawl, representing 14,700 hooks, and they were in the water three hours when dogfish attacked the bait, and before we could haul them we lost 8 tubs, valued at $40. Hooks and gangings on balance of trawls were destroyed to the amount of $25, together with $200 worth of fish eaten, and it took two days to repair our gear so we could fish again. (Capt. Alex McEachen, Gloucester, schooner "Maggie and May," 18 men.)

This spring we caught a school of mackerel and dogfish, and after we had picked out the mackerel we had about 100 barrels of dogfish left. It consumed a great deal of time, and we had some damage done to the fish and our seine. Last year we lost at least $2,000 worth of fish by dogfish attacking our seine on the outside after we had mackerel in it. In the fall when we are fishing for pollock we are bothered more or less the first of the season. (Ralph Webber, Gloucester, schooner "Marguerite Haskins," 18 men.)

I have been hand lining on Georges, Browns, La Have and Western banks for thirty years, and dogfish are getting so plenty that at times it is almost impossible to fish, and we have to return with small trips. They seem to come earlier and stay later each year. There are times when we could lay and fish on a small quantity of fish, but dogfish eat our bait before we can get a fair trip. I think we could make at least $50 more per man each season if we were not bothered so much with dogfish. (Benjamin Johnson, Gloucester, schooner "Lawrence Murdock," 14 men.)

It is my opinion that when dogfish are plenty we make more money, as there is less edible fish landed, and we get higher prices. Last spring on one trip we lost 20 tubs of trawls, valued at about $140, by the dogfish. It is my opinion that a bounty of 1 cent a fish would not encourage the fishermen to catch them. (J. O. Brigham, Boston, "Shepherd King.")

It is my opinion that the price received for the dogfish would not pay us to save them. (Julius Anderson, Boston, schooner "Robert and Arthur.")

In August, 1905, we set 40 nets just southeast of Thatcher's Island, 5 miles, at 7 P.M. Had to haul them immediately, on account of dogfish being so numerous. We got 50 mackerel, — 20 salable, and 30 eaten all except heads; price, 25 cents each. This was done for several nights, with the same results. On September 1 started hand-line fishing on grounds located from Eastern Point, Gloucester, to Newburyport, about 5 to 10 miles off shore. Have been on the grounds the

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past seven days, and each day after catching a few food fish, dogfish have appeared; and after making two or three berths of from 1 to 2 miles each we were obliged to leave the fishing grounds. (Capt. Wm. P. Brinnick, Boston, sloop "Jennie Maud," 3 to 4 men.)

We fish with trawls in the spring of the year until dogfish make their appearance; then we go south and fish for mackerel with nets. Dogfish are very numerous when the mackerel appear, and it is hard work to keep clear from them. They follow the fish along the shore, and are a pest from May until November, and sometimes later. The more mackerel, the more dogfish. They are so plenty in Massachusetts Bay after July 1 that we abandon netting and go sword-fishing until about September; then we go hand lining or trawling. Last spring one night off New York we lost 10 nets, valued at $10 each, besides the fish they contained. We had taken from part of our nets 1,800 fish at 40 cents each, when dogfish struck; and we lost 10 nets and all the fish in the remaining net, valued at $2,000 to $4,000. (Capt. Fred Wolfe, Boston, "Priscilla," 8 to 12 men.)

We have not been bothered so much in the channel this summer as previous years, and we have caught a great many more fish. We have had to sell them cheaper, although we have made as much money. When we strike dogfish they ruin our gear and prevent us from getting a trip. In September, 1905, we made 2 sets, and got a large quantity of dogfish, and did not get 1,000 pounds of food fish; the 3 previous sets, in the absence of dogfish, we got 8,000 pounds of food fish each set. (John Thompson, Boston, schooner "Mary Edith," 14 men.)

Dogfish have been so plentiful for several years we cannot set any mackerel nets in falls as we used to, as dogfish chew the fish and gear all to pieces, and trawls about the same. (J. W. Sears, Provincetown.)

I think it would be the best thing that could happen to the fishermen, and to the public at large, making it possible to catch fish that it is now impossible to catch on account of dogfish. (Joseph Hobert, Provincetown, "Vesta," 4 men.)

I have been in the business 20 years, and when I first went, the dogfish would come about June 1 and go north in Massachusetts Bay, and be through by July 15. They would come back about September 1, and October 1 they would be gone by. Now they come May 15 and stay till November 1, without going away. When we are engaged in trawling, from November 1 to May 1, the dogfish are not on the coast. (John K. Cobb, Provincetown, schooner "Betsey Ross.")

We arrived at Boston to-day, Nov. 3, 1903, from fishing off Highland Light, Cape Cod. Small dogfish were very plenty there, and bothersome. We would have had 25,000 or 50,000 more pounds of fish, if dogfish were not there. During this summer we have lost by dogfish, in two trips alone, 50 tubs of trawls, valued at $300. (Antonio K. Sousa, Provincetown, schooner "Philip P. Manto.")

It is almost impossible to fish with nets in Barnstable Bay now. The main damage is that where they have been we cannot catch any other fish. (Alfred A. Mayo, Provincetown, "Iris.")

Dogfish have driven many of our boat fishermen out of business by the destruction they have made, causing much loss of time and labor.

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Used to save livers when they were in good demand for oil, but of late years they have not been worth marketing, unless encouragement is given by adding bounty. (William Pierce, Salisbury, dory, 1 man.)

Believe annual damage to trawls and hand lines will average from one-half to three-quarters of actual value. Have seen large quantities of hake and other good food fish driven upon beach by schools of dogfish. Market fish caught on trawls often entirely destroyed by dogfish, which are also found on trawls in large numbers. (H. F. Woodward, Salisbury, dory, 1 man.)

Dogfish cause great destruction to trawl gear; also responsible for large loss of bait and food fish. Have found may large cod and other food fish, which would weigh from 50 to 70 pounds, entirely eaten by dogfish, leaving only head and backbone hanging to hook. Set trawls with 900 hooks, and on hauling counted 700 dogfish, 2 hake, 1 cod. (Wallace Kenney, Beverly, sloop "Governor Cleaves," 2 men.)

Twenty years ago there were about 150 sail of small fishing boats belonging to this port; in the past year there were less than 50. A great deal of this decrease is directly responsible to the dogfish pest, which has practically driven two-thirds of our fleet out of business. This seems to me to be an unanswerable argument in favor of a bill to protect this industry, by paying a small bounty towards the wiping out of this nuisance. (Charles S. Currier, Newburyport, dory.)

Used to make good year's work fishing. Now in spring of year, when dogfish school about here, have to knock right off trying to fish, as they will destroy all food fish caught, and cause great damage, if not total loss, to all fishing gear put in water. Have hauled trawls finding nothing but head or backbone left of codfish which would weigh, if whole, from 60 to 70 pounds each; others with large bites taken out, entirely destroying market value. If fishermen were encouraged to make war on them by a small bounty, think everybody would benefit greatly by their decrease. (George M. Souther, Newburyport, dory.)

Dogfish will bite holes in a gill net about 4 or 5 inches square; also on trawls bite off the gangings and completely destroy same, taking bait and hook, leaving nothing but running line. We lose about from one-third to one-half of our trawl gear every year in this manner. If a bounty is passed, will try to have satisfaction on them for losses sustained. They have driven about two-thirds of our former boat fishermen out of the business entirely. (A. P. Hilton, Newburyport, gasoline boat, 2 men.)

Dogfish annually cause a heavy loss to small-boat fishermen. Trawls set over night are often found stripped of all marketable fish, besides being wrenched apart and snarled up so as to cause often total loss of material. After dogfish make their appearance many fishermen have to lay idle a long time, or go into some other industry to make a living. (Clarence C. Lunt, Newburyport, gasoline boat, 2 men.)

Mine is the same story as that of everybody else around here. Dogfish are a great nuisance, and if they could be driven off shore or destroyed, believe it would be of lasting benefit not only to fishermen but to general public. When dogfish strike round here a great many of the boat fishermen, after suffering their first losses, haul their trawls

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and go ashore to loaf, causing great loss of time, and making fishing pretty poor business to get living at. Fishing fleet of this port reduced over two-thirds inside of twenty years. (George Thurlow, Newburyport, dory.)

Have been fishing from here for many years, and have seen fleet of this port decrease in number from about 150 to present number, below 50. Believe dogfish are directly responsible for driving many fishermen out of the business. Twenty years ago could get as high as $1 to $1.25 per bucket for dogfish livers; present worth about 25 cents. This price, unless small bounty is attached, does not pay fishermen to try to kill them off. (Jabez M. Eaton, Newburyport, dory, 2 men.)

Don't use anything but torches and dip nets to catch herring with, as I only fish short time each year. Have seen lots of damage done to nets and drag seines by dogfish getting inside and tearing their way out. Have seen lots of dogfish at night chasing schools of herring 2 or 3 miles up the river. (John E. Dolan, Ipswich, gasoline boat, 2 men.)

Used to save dogfish livers some years ago, but at present price not worth marketing. Large schools of dogfish come off here in spring, and see scattering ones up to late in fall. Follow herring up in river, and cause destruction to fishing nets, etc., besides destroying fish caught in nets and on trawls. (Samuel S. Small, Ipswich, Grape Island, gasoline boat.)

Have caught as high as 200 dogfish on hand lines in part of day, and lost all of bait. Have to lose much time in fishing by changing from one spot to another, on account of large schools of dogfish. When fishing for herring in river often see dogfish up 2 or 3 miles from mouth, after schools of herring. Many herring caught in nets destroyed so as to be unmarketable. (Edward Kent, Ipswich, dory.)

In using drag seine or set nets often have them damaged by dogfish, besides having to throw away many fish which were bitten by dogfish so as to destroy market value. Don't think annual loss to apparatus ($50) is any over-estimated, as some years it will cost a good deal more than that amount to repair gear alone, not reckoning time lost in fishing. (John E. Haynes, Ipswich, gasoline boat.)

I fish mostly with crew of other boat, but occasionally set few nets for myself. Have often seen dogfish up in the river 2 or 3 miles. Believe they chase and scare the herring and bait fish, so as to make them a great deal harder to catch by fishermen. Often find herring partially eaten after being caught in nets. (Herbert T. McKenney, Ipswich, gasoline boat.)

Only fish for herring in fall of year, mostly in the river and vicinity. Dogfish often seen chasing schools of herring, making it harder for fishermen. In fishing with drift or set nets, find large numbers of herring caught, so badly eaten as to destroy them for market. (J. F. Claxton, Ipswich, gasoline boat.)

In replying to the foregoing questions, I have answered as truthfully as possible, and there are some questions asked which are very hard to answer. I have seen $300 worth of trawls destroyed in one day by dogfish; and I have no hesitation in saying that unless the fishermen are paid for destroying them, dogfish will be so numerous

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in Massachusetts waters that it will be impossible to obtain any food fish during the summer months. If we were paid for destroying them, when we get them on our trawls we could kill them by cutting off tail. Now we merely shake them off as quickly as possible, so we can get our trawls set again. (Valentine Neil, East Boston, schooner "Elmer E. Gray.")

Dogfish are so plentiful on the coast and in the bays that it is impossible to fish there between the months of May and November, and we have to go to some of the off-shore banks, such as Georges and Browns banks. If there was a bounty on dogfish (enough to make it an object to catch them), it would open a new industry for the fishermen, and would give hundreds of men and boats employment during the summer season without going to the banks, and in a few years would materially increase the supply of edible and bait fish. (E. J. Cunningham, Boston, "Stranger.")

On one trip this summer we lost $200 worth of gear, owing to the dogfish. (T. W. McComiskey, Boston, schooner "Catherine D. Burke.")

If a bounty was placed on dogfish, I fear that it would be harder to get crews to fish for marketable fish, as the bounty would start the men for dogfish. (Antonio P. Goulart, Boston, schooner "Walter P. Goulart.")

I think if bounty went on dogfish it would make them scarce, and save labor for men and increase wages; and, more, it would give the men courage to destroy them. (Larance Norris, Boston, "Mary A. Whalen.")

My opinion in regard to the dogfish question is this: they are both a benefit and an injury to the fisherman. Where they are a benefit is this: they act as a scavenger, and eat up the gurry when you are dressing the fish, which, if they did not, would sink to the bottom and rot and drive the fish away. They destroy the trawls, which are replaced by new, which is really a benefit to fishermen. They are in these waters during the summer months, when there is an over-supply of fish; and if the dogfish destroyed more than they do, the fishermen would get more for what fish they brought in, and the market would not be glutted as it is now, with the fleet of vessels that is now fishing. I think that the dogfish are more of a benefit than an injury to the fishermen at the present time. (H. Daly, Boston, schooner "Harmony.")

That the damage is not confined to the Massachusetts fishing interests is made plain by Professor Prince's statement: —

The direct harm that a plague of dogfish can do is well-nigh incredible. Thus in 1882 the pack of cured herring in the Shetland Isles was 134,000 barrels, whereas in 1888, owing to the presence of dogfish, the total quantity fell to 99,000 barrels, and in 1889 even lower, *i.e.*, not more than 47,000 barrels, or only about one-third of the pack two years before, and representing therefore an enormous total loss.

Many similar cases could be instanced; but the facts as they exist to-

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day in Canada are startling enough. The statement by Mr. Copp, M.P., in the House of Commons, Ottawa, on October 28 last, sufficiently indicates the grave nature of the matter. "The dogfish have become a serious menace to our fishermen in Nova Scotia," he said. "If the problem is not dealt with in some way it is going to seriously affect the fishing industries of the Dominion. . . ." The "Halifax Herald" of October 3 shows how the dogfish is helping to destroy the industry in Nova Scotia. This newspaper tells of "half a million shortage in our western Nova Scotia fisheries." It is estimated that west of Halifax (that is, in the counties of Lunenburg, Shelburne, Queen's, Yarmouth and Digby) the fishery catch is $400,000 to $600,000 below the average year.

A recent newspaper notice once more expresses this feeling of alarm: "Every week brings reports from widely different points about the trouble by dogfish, which are more formidable pests by sea than the potato bug is by land. Therefore some people contend that the government should take the matter up, and do something to exterminate the invading swarms of dogfish, or make them scarcer."

Opinions as to the best method of dealing with the dogfish nuisance upon the Atlantic coast appeared to be so diverse that much difficulty arose in deciding how best the government could aid in abating the plague. Professor Prince treated the whole subject in a special report last year, and summarized the many schemes, which had been urged upon the department's attention: —

The Fishery Commission in Gloucester County, N. B., which specially inquired into the matter along the south shore of the Bay des Chaleurs, found that the fishermen generally favored a government bounty, and the commissioners in consequence recommended the payment of an adequate bounty to encourage the fishermen to exterminate the dogfish. The Commissioner of Fisheries himself favored departmental action through its officers as the most direct method of coping with the evil, as it appeared that a large bounty could not be offered, and the fishermen could not be expected to forsake their ordinary remunerative occupations and sufficiently exert themselves to capture the schools of dogfish. A further scheme was the organization of reduction works at the certain central points, where valuable products could be manufactured from fish waste, dogfish, etc. The manufacture of oil and fertilizers from dogfish, fish offal, etc., it was claimed would make possible adequate payment to the fishermen for the dogfish captured and the fish offal brought to the reduction works, and the extensive and rapid destruction of the schools of dogfish would be actively stimulated.

Hence a large building is being erected at Canso, as the first of these government-aided reduction works; and the plant, manufactured by the American Process Company of New York, is being installed

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so that the utilization of dogfish and fish offal will be carried out next season.

Two other plants have been obtained by the government, and reduction works will be erected this year at some point north of Canso and at some point in western Nova Scotia. They will probably be run under departmental auspices, unless it appears more advantageous to have them operated under some mutual arrangement between the department and the local fishing firms. Whatever will most rapidly and effectively secure the extermination of the dogfish and their conversion into marketable products will, it need hardly be said, meet the general approval of the fishing population, who have suffered such serious losses in recent seasons from the dogfish plague.

Their use as food has long been recognized in Norway, the Channel Islands, and in the Hebrides and northern islands of Scotland; and, indeed, in Aberdeen, Scotland, dogfish prepared in various more or less appetizing ways have found a ready market, and some such scheme is being tried by several parties in the maritime provinces. Recently three or four enterprising lobster packers in Prince County, Prince Edward Island, Cape Breton and Richmond counties, O. B., and in Shelburne and Digby counties, western Nova Scotia, have most successfully put up canned dogfish, which have been pronounced in that preserved form as "superior to salmon."

In most markets a prejudice exists against dogfish and all such members of the shark tribe, especially amongst our own population, who have such a superabundance of the most excellent kinds of food fishes available in the lakes, rivers and seas of the Dominion. No means, however, of creating a demand for dogfish products should be neglected, in view of the fact that, unless extensive measures be taken, and the wholesale extermination of dogfish stimulated, this greatest and worst enemy of the fishermen may continue to inflict loss and destruction along our Atlantic shores.

From the Atlantic coast and the Shoals of Northumberland the complaints are general of the apparently increasing quantities of these fish, and of their interference with the line and net fisheries, — the line fishing by taking the bait, and the net fishing by destroying the fish in the nets and the nets also.

The ravages of these scavengers of the sea have been written about so frequently to your department during the past few seasons, and by those interested, that it is needless for me to refer at any length to this important subject. The newspapers of the maritime provinces, with those of the New England States, have been deluged with correspondence on this very absorbing topic for several years past. What action to take in dealing with these sea wolves is a subject of serious concern for the whole North Atlantic seaboard, and it is earnestly hoped that vigorous steps will be taken which will lessen the ravages of this voracious fish, or that the schools of dogfish will make one of those surprising and mysterious movements with which they are credited, and disappear from our coasts with the same rapidity that they invaded them.

Speaking about the mackerel industry, I may say that the waters of the gulf this season contained the greatest abundance of mackerel

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ever witnessed as yet; but the general catch has been very limited, owing to the presence of dogfish on the grounds. Literally, mackerel were routed, as it were, from the shore, and had made an entire abandonment by the first of October. Although one of the greatest impediments to successful fishing of all kinds, the dogfish, looked upon with horror and disgust, bids fair to become, when largely introduced, one of the greatest and most remunerative industries in Canada. Foreign nations have already made a test of the dogfish, and pronounced it a favorite and substantial food fish, with very nourishing elements. On October 20 Mr. Geo. LeBrun packed a case of dogfish. I was in his kitchen on that day while he was preparing the fish, and he had some cooked on the table, which he offered me. I was much surprised at the taste, and found it very excellent, and not in the least oily, as anticipated. The flesh was white and soft, and very palatable. It must be borne in mind that the flesh of the dogfish contains no oil whatever, as none can be found or even tasted whenever cooked; hence the oil must be attributed to the skin.

The greatest drawback of late years to the successful prosecution of the fisheries is the dogfish pest. What is to be done to exterminate them must engage the attention of the department. No doubt the home of this species of the shark family is the southern waters. Fifty years ago they were as numerous and destructive to other fish in the coastal waters of the maritime provinces as they are to-day. At that time large numbers were captured by the fishermen. A gallon of dogfish oil was worth then from forty to fifty cents; to-day less than half of that sum could be realized. Not only were those fish captured in the fifties and early sixties for their oil, but the flesh was fed to hogs, and sometimes dried, ground and fed to horses and cattle. They frequented our coastal waters during the summer months for about twelve years, when they disappeared until ten years ago; since then they appear to increase in numbers year by year. They make their first appearance each summer in the month of June, or about the time the mackerel make their appearance from the southern waters. The dogfish remain all summer. In the autumn they disappear, or about the time the mackerel schools begin journeying to their southern haunts. Like mackerel, they cannot exist in our waters in winter.

Not only are the dogfish a hindrance to the successful prosecution of the fisheries on account of their destruction of the gill nets, and devouring the fish caught in nets and on trawls, but they frighten the food fish from our coast. Early in June I visited some of the cod banks off Sydney harbor. Equipped with cod gear, I fished on these banks, and experienced no difficulty in catching cod. An occasional dogfish was hooked, but they were not numerous on these banks at that time. In August I again visited the same banks, and no sooner did the baited hook reach near the bottom than a dogfish would bite. There were no codfish on the banks, evidently driven away by the voracious dogfish. A number of the mother fish caught were opened, and young taken out. From 3 to 5 young, 6 or 8 inches long, proved to be very much alive. They would squirm about the deck of the steamer as lively as the full-grown fish. Each of the young had a sack on one side near the neck.

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The dogfish multiply very rapidly, and unless fished, or some means adopted to exterminate them, they will ultimately ruin our commercial fisheries. There is no doubt dogfish are the direct cause of the failure in recent years of the midsummer herring fishery. This excellent food fish, before dogfish made their appearance on our coast, came into our bays and harbors in immense numbers. They were captured by fishermen and farmers by means of gill nets. Of late years, or since dogfish made their appearance, these valuable fish have disappeared from our coast. A bounty offered by the government of 20 cents per gallon for their oil would induce their capture by fishermen.

On the European shores of the Atlantic, too, similar conditions obtain. A writer in the "London Mail" says: —

The cry has gone up, "The dogs are upon us!" This is no new cry. From Plymouth to the Lizard, from Newlyn to St. Ives, all along the best fishing grounds of the west there comes this moan when the leaf falls, — "The dogs are upon us!" And season after season the moan increases in anguish, until the cry is loud and bitter, as it is to-day, when our deep-sea fishers return with nets torn, and tons of dogfish upon their lines, for which there is no paying market.

Our fishers are so helpless, which makes the moan pathetic when first heard, and then tragic and more tragic when winter comes, and with winter, want and the bitter cry of women and little children. And this happens year by year now, conceal it how we may, when the "gluttons of the sea" come in countless numbers, hunting, in close formation, pilchard and herring, and then swooping upon everything that swims. There is no mistake about numbers in the packs, for the fishers say they are so thick that one "may walk on them;" and in home waters there is nothing to be compared to a charge of dogfish for magnificent destruction. It is not war, but slaughter of timid, dainty clupea, which dogfish devour until they vomit, and then continue their almost endless feast. The fishermen speak of the advent of these gluttons as a "plague," and the plague has increased, and is increasing, in territorial waters.

The story is simple. Dogfish hang upon the outskirts of immense shoals of pilchards, driving them towards the English Channel and into the sheltered bays of the Cornish coast, wherein they are captured in seines and driftnets. The more venturesome of our drifters meet them early in the season in the deep waters of the Channel, but the evil days come when the keen hunters approach the shore and prey upon the fish, now feeding with a delicious sense of security in sheltered bights and bays. Our fishermen know the fact all too soon when their nets hang in ribbons, and the captured fish are devoured already, or remain in the mesh in all stages of mutilation. Formerly this "plague" was recurrent, and old men speak of long intervals between one plague and another; but now the dogs have multiplied out of all proportion, grown bolder, and hang on to their prey even when the men are drawing their nets, or what is left of them.

The cry, "The dogfish are upon us!" terrifies fishers and paralyzes

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industry for a season, for men may lose in nets alone in one night the profits of a month's strenuous labor. Last year 300 drift boats, carrying over 1,000 hands, were kept idle in the little ports of Looe, Polperro and Mevagissey alone, the men preferring to earn nothing in the very midst of their season's harvest, to the risk of having their nets cut to pieces by dogfish. At Plymouth, boats were idle and soup kitchens opened; and at Mousehole, Newlyn and St. Ives, distress was great. It is the fact that packs of dogfish effectually blockaded the fishing ports, and continued to do so until pilchards disappeared and the herring fishing was spoilt. The dread experiences of last year have so far been repeated. Swarms of dogfish are reported everywhere. The drifters venturing out hug the coast at the risk of having their nets torn by the rocks, and then only fish half time, through fear of the dogs scenting them and spoiling their gear.

There are several varieties of dogfish, all having the same gluttonous and destructive instincts; but the picked dog is the most dreaded, being armed under its two dorsal fins with sharp curved spines, with which it rips nets hanging in the sea with the ease of a mower cutting grass with a scythe. The mischief is not confined to the drifters, but extends to long liners, who fish abundantly in these waters for conger and skate. The dogs carry off their bait, sometimes bite off the hooks and go free, and when caught are of but little commercial value. A Looe fisherman recently reported hauling 1 conger and 500 dogfish on his "bolter;" so the men look serious when spoken to, and ask anxiously if some remedy may be found.

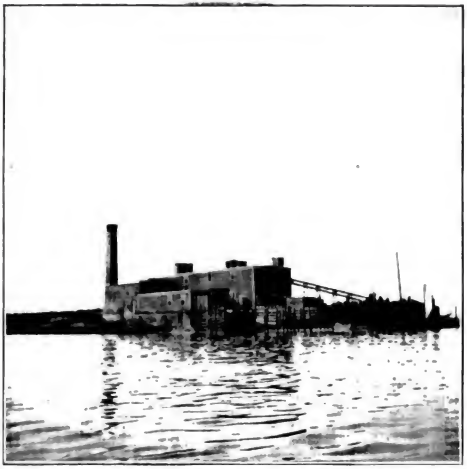
Dominant Species.

That certain species become dominant, and increase so rapidly and over such a wide range of territory as to greatly diminish the number of other species of similar habitat, is a well-known biological fact, which requires no further proof. The most immediate examples are the English sparrow, the gypsy and brown-tail moths, etc. The facts indicate that the dogfish as a species is actually increasing in numbers, and appears to be likely to become such a dominant species; and until some natural or artificial check upon its increase arises, the damage done to the wealth-producing capacity of the North Atlantic Ocean will extend rather than lessen.

Causes of Increasing Numbers of Dogfish.

The causes of these increased numbers of dogfish are difficult to ascertain. There appears no very obvious diminution in the numbers of the enemies of the dogfish. They are not known to be subject to any special epidemics, as are many other fish, *e.g.,* the salmon family, menhaden, etc., or to be liable to

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1. DOGFISH REDUCTION WORKS AT CANSO, N. S.



2. CATCHING DOGFISH, CANSO, N. S.

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any such cataclysm as destroyed such incredible numbers of tile fish; so that one is almost forced to seek the cause in the effect of human agency upon the balance of fish life. For almost three hundred years the North Atlantic has been scoured for marketable fish. The breeding fish and the young of all sizes have been marketed or wasted with almost unspeakable prodigality. Our attention has in the main been devoted to the more readily available fish, such as the cod and herring family, mackerel, etc., while the dogfish, sharks, skates and rays have been gotten rid of with the least exertion or expense. Their capture has been even avoided to the utmost possible extent. It is a general practice to seek new fishing grounds when the dogfish strike. Thus the dogfish has been practically immune from capture. Other species have in many cases decreased in numbers. In no other case which the writer now recalls has there been a marked and certain increase. The dogfish, thus freed from a part of the competition, and so much better able to secure food, has multiplied in all sections of its range. The fishermen are largely responsible for this, though chiefly on account of the absence of knowledge and experience with such problems. Professor Prince, in his able report upon the dogfish plague in Canada, says on this point: —

If the parent dogfish, with their unborn brood of young, ready to emerge into the sea, were brought ashore, it would be one of the most effective steps possible to reduce their numbers. Yet it rarely, if ever, occurs to a fisherman to do this. Instead of that, the young are freed, and the parent fish, mutilated in some way, are as a rule also replaced in the water, though mutilation is of little moment to a dogfish. They are so hardy that even after the tail is cut off or the head badly injured they will swim off most actively. A shark, after being most cruelly injured, has been known to immediately return to the bait and be captured a second time. Owing to the hardy and well-protected character of the young, the offspring of a single female, though few in number, may approach, as already stated, the progeny of the cod or salmon, which produce eggs by thousands or even by millions each year. Fishermen hold that dogfish breed all the year round, but this is not so, and the fall and winter months appear to be the principal time. . . .

Further, fishermen and others should be discouraged in the common practice of liberating young dogfish in the ocean, and the destruction of the parent fish with their broods of contained young should be enjoined. If, as is stated, the dogfish taken in December are for the most part females, their capture at that time is of immense importance.

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The destruction of breeding female fish has been abundantly shown to be a direct means of reducing the supply of fish in the future. The increase of dogfish in recent years has been accounted for by their less extensive capture for oil purposes. The low price of fish oil has discouraged the annual destruction of dogfish, formerly carried on systematically. But that suggestion will not account fully for the increase.

Various Methods which have been suggested for checking the Incursions of Dogfish.

Many suggestions looking to increased killing of dogfish have been made by numerous individuals more or less competent to judge of the merits of various plans. These have been earlier summarized in Professor Prince's report: —

1. Liberate alive some hundreds of dogfish having securely fastened outside their bodies (by means of hooks, wires, etc.) glittering and gaudy streamers or jingling chains or bells, calculated to terrify and frighten away the schools of dogfish, on the old principle of setting at liberty a rat with a bell hung round its neck.

2. Inoculate a number of dogfish with some fatal or contagious disease, thus securing the infection and death of all the schools of dogfish which may hover near, on the principle adopted in reducing the pest of rabbits in Australia some years ago.

3. Dynamite the great schools of dogfish when they appear.

4. Employ the government cruisers and their men in capturing these pests, or let the government employ special vessels for the purpose, until the plague is reduced.

5. Pay a bounty of 1 cent for every five tails of dogfish ($2 per 1,000) brought to a fishing officer, and, after being officially recorded, destroyed by such officer. Many fishermen have declared that they get 1,000 dogfish in a single day not infrequently; yet it is asserted that even $2.50 per 1,000 would not pay.

6. Pay a bounty on the basis of the weight of the dogfish captured, say so much per 100 pounds. Some parties claim that $2 to $3 per ton or ½ cent per fish would pay the fishermen; while others say that, as dogfish average a weight of 4 pounds, such a bounty of 1 cent each fish would pay. Thus the suggested rates range from 10 or 15 cents per 100 pounds to 25 cents per 200 pounds.

7. Pay a bounty on the total yield of oil, a fixed rate on each gallon of oil produced by a factory being guaranteed to any firm or company carrying on reduction works.

8. Use long seines of strong cord, 1,000 yards or more in length, under departmental direction, and surround the schools, as is done with the schools of sharks in India.

If, as seems clear, the commercial products yielded by dogfish bring such low returns in the market that it will not pay oil and fertilizer factories to utilize them, and cannot therefore pay the fishermen to fish for them or even to save them when caught accidentally, then a

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3. ARRIVAL OF DOGFISH CATCH.



4. LANDING DOGFISH.

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bounty paid by the government seems to be necessary. The livers of dogfish bring to the fishermen 25 cents per pail, and on an average perhaps at least 50 dogfish are required to make a pail of livers; and the loss of hooks, bait and time have all to be included; hence only the encouragement of a bounty will ensure the energetic and continuous destruction of these fish. Certainly the suggestions numbered 1, 2 and 3 would probably harm the schools of valuable fishes as much as the detested dogfish, while the employment of a few vessels or government cruisers would not suffice to deal with so general a pest as the dogfish on our shores. Reliance can be placed only on the co-operation of the fishermen all along the coast, stimulated by a bounty fairly and effectively distributed on a workable basis; unless, indeed, the dogfish in the meantime take the course they have so commonly taken in former times and on other coasts, and disappear as suddenly as their hordes originally have appeared. The problem would then solve itself.

Development of an Economic Demand for Dogfish.

Of all the suggestions made, the one which offers most advantageous features to all parties concerned, — to the public, which now pays a higher price for fish than would be otherwise necessary; to the fishermen, who now lose much time and suffer annoyance and damage from the voracity of the dogfish; to the capitalists, who find the interest on their investments cut by the loss of gear and time, — is the development of an economic demand for dogfish. A bounty of a fixed sum for each dogfish destroyed, paid either directly to the fishermen, or, what would practically amount to the same thing, a subsidy or "protection" (protective tariff) to every industry based upon economic utilization of the dogfish or dogfish products, such as, for example, the utilization of the cartilaginous skeleton and the connective tissue of the skin in making glue (it has been ascertained that the disagreeable oily odor can be completely removed by treatment with live steam), and the preparation of the remainder of the carcass as a poultry food. If the sterilization is made by live steam, the flavor of the flesh will be modified so that the proper amounts can be fed to laying hens without causing a disagreeable or fishy taste to the eggs; while as a food for growing chickens and ducks it should be one of the best and cheapest sources of protein, — the most necessary and the most expensive element in the ration. Obviously for such a purpose only perfectly fresh dogfish should be utilized, for poultry as well as human beings may suffer from ptomaine poisoning. Old or

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inferior quality may be profitably utilized in the manufacture of fertilizer. The liver and eggs should be removed, and the oil extracted separately from the body meat. Mr. Ellison of Cleveland, O., states that according to his observations 15,000 pounds of dogfish yielded as follows: the livers weighed 2,274 pounds, which furnished 1,010 pounds of oil, or about 44 per cent.; the bodies, weighing 12,726 pounds, furnished 605 pounds of oil, less than 5 per cent., and 2,573 pounds of fertilizer, or about 20 per cent. (He does not, to our knowledge, state the per cent. of water in this fertilizer, or the results of chemical analysis.)

The observations of Mr. A. B. Cox, manager of the dogfish reduction works at Canso, N. S., indicate that on October 3 the dogfish livers contained a far larger percentage of oil than Mr. Ellison found. Mr. Cox's figures indicate a yield of practically 75 per cent. of oil from the livers and 5 per cent. from the flesh. It is probable that these differences in yield of oil are due to the greater freshness of Mr. Cox's material, as it is well known that dogfish, whales, etc., lose a considerable percentage of oil unless the rendering process immediately follows death.

The Dogfish Reduction Works at Canso, N. S.

Oct. 2 and 3, 1905, we personally inspected at Canso the first of the dogfish reduction works to be put into operation under the auspices of the Department of Marine and Fisheries of Canada.

This establishment began operations about September 15, and was designed to reduce about 10 tons of dogfish or fish offal daily. The machinery used was furnished by the American Process Company, and is of the type generally used in the "menhaden factories" in this country, and with certain modifications in the "whale factories" of Newfoundland. At the time of beginning operations Mr. Cox was obliged to make a week's trip among the fishermen, to explain the plan and to induce them to bring in the dogfish caught. As soon as shipments began to come in from points outside of Canso, *e.g.*, Arichat, Petit du Grat, etc., the Canso fishermen began to save their dogfish. The result was a great surprise to all. It had

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5. THIRTY-TWO TONS OF DOGFISH ON THE WHARF.



6. REMOVING LIVERS.

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not been realized how many dogfish had been hooked and thrown overboard again. One of the fishermen had 2 trawls, set with 1,500 hooks on each. He tended the first trawl as soon as the second trawl was set, and "nearly every hook had a dogfish." On October 2, in spite of the fact that notice had been sent out the two days previous that, on account of the overwhelming quantities which came in, no dogfish would be received until October 4, we saw 8 loads from steamer, small schooners and dories brought and landed upon the dock. Three dories brought 7 tons, three small schooners brought 17 tons, and one small steamer brought 8 tons, — a total of 32 tons. The price paid for the fish delivered on the dock was at that time $6 per ton if "livered," and $5 per ton if "unlivered." These prices included the livers. Even at $4 per ton the dogfish would have been a bonanza for the fishermen. Two men in a dory could easily make from $7 to $8 a day per man, catching dogfish within one mile of their own homes.

Since our visit we learn that many improvements in the process have been developed, and several new mechanical devices are to be instituted. The results of treating the livers separately from the bodies have been much more satisfactory. The drying process has been much accelerated, and has resulted in a quality of fertilizer which more readily becomes available for plant food in the soil.

There is a probability that certain special parts may be utilized for particular purposes, *e.g.*, the fresh eggs may be conserved in such a manner as to be used for some of the purposes for which the yolks of hen's eggs are now demanded. The embryo dogfish ("pups") may be found to be satisfactory bait, and thus be worth handling separately. Further investigation may disclose internal organs which can be converted into gelatin, after the manner of the "sounds" of sturgeon, hake, weakfish, etc. But above all, the flesh and the offal are converted into a valuable fertilizer, which will be of great assistance in increasing the crops of potatoes, fruits and garden truck, by furnishing a type of fertilizer much needed, on account of the short season, for pushing the crops to the rapid maturity necessary.

We learn that the plant has been inspected and has received the approval of the officials of the Department of Marine and

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Fisheries. The general sentiment among the fishermen is favorable to the project. The chief objections are found among the opponents of the present government, who claim to see therein a shrewd political move. Be that as it may, the project promises the destruction of a vast number of dogfish, thereby benefiting the public and the fishermen through the improvement of the bait and food fisheries. It furnishes a market for what was previously a "waste product" of the fisheries, or, even worse, a waste product which was positively injurious, unless removed at a considerable expense. In addition, it is a direct benefit to the farmers and to all citizens and land owners, since it furnishes a valuable fertilizer readily available at a low price. It is therefore not strange that such efficient action should have strengthened the political party which made such a project possible.

Similar Plants Elsewhere.

Since our visit a second and similar plant has been put into active operation at Shippegan, N. B., on Chaleurs Bay, and contracts for a third plant have been placed.

A Honolulu correspondent of the "New York Tribune" recently wrote that: —

> A company has been formed to hunt sharks on an extensive scale, and as a commercial enterprise. Several schooners have been purchased and fitted out with the necessary paraphernalia and appliances for capturing these monsters of the deep.
>
> The purpose of shark hunting is two-fold. One object is to obtain oil from them, the remainder of the shark to be used in the manufacture of fertilizer for the sugar plantations of the islands. Shiploads of fish offal from the Alaska salmon canneries are brought here every year to be made into fertilizer for sugar lands, and it is believed that the bodies of sharks will supply the same material, and at less cost.
>
> The oil is to be sent to China, where there is a great market for it. Some shark oil has been sent to China from there for many years, but the greatest drawback to the trade was that until now there was no method whereby the strong odor of the shark could be eliminated from the oil. A successful process has at last been discovered, by the treatment of the oil with live steam, and a demand has been created for this product which is greater than can at present be supplied.
>
> In the fertilizer works it is estimated that thirty tons of shark a day can be utilized, and that this will employ the services of at least three schooners and their crews.
>
> The waters of these islands teem with sharks, and shark hunting is a pastime that appeals to many.

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7. LOADING THE ELEVATOR.
The small white spheres on the cleared space on the wharf are dogfish eggs.



8. DRYING DOGFISH, FOURCHIE, C. B.

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Dogfish as Food.

There is another phase, and perhaps the most important asset in the dogfish problem, viz., its availability as a cheap and wholesome food. From personal experience we can give testimony to its satisfactory taste, lack of odor or "strength," and its consistency when cooked or canned. It has, when canned, a distinctly obvious lobster flavor, together with a certain salmon impression, so that from the taste it can best be compared to a mixture of canned lobster and canned salmon. When cut into steaks and fried, it closely resembles halibut. Its freedom from bone makes it especially safe as a food for children or for aged persons. There would appear to be unlimited possibilities for developing a business in specially prepared brands of food, wherein the dogfish may be combined with rice, potatoes, etc., making "canned fish balls, all ready to fry," etc., after the manner of "fish cheese" now being much used in Newfoundland and Nova Scotia. The inferior cuts of meat can be converted into a food for growing poultry, pigs, etc. Objection may be raised to the fact that fish food may tend to affect the taste of meat when marketed. This is true of other foods besides fish, but it can be obviated by the proper method of feeding. On the coast of Nova Scotia dogfish are dried and fed to horses. "One every three days brightens the coat."

Our English cousins are in advance of us in the exploitation of the dogfish as a valuable, cheap food. A writer in a London paper says: —

> The dogfish is excellent eating and ridiculously cheap, and the remedy should be near. Make it worth our men's while to catch, and the species will enter on a struggle for existence. Last year the Cornish fisheries committee held an official inquiry at the principal fishing ports, when it was clearly shown that, after paying all costs, charges and expenses, fish sold at Billingsgate at 1½ d. per pound would pay the fishermen to catch in ordinary seasons. The Plymouth council engaged an expert cook to prepare dogfish for the table, with and without sauce, and the published results were excellent as to color, flavor and firmness under the slicer. No fish not "prime" could be better spoken of. Then it is nutritious and boneless, and so a very safe food for both young and aged.
>
> The committee of inquiry concerned itself but incidentally with the dietetic qualities of the fish and its value as a national food asset. They

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reported, however, on the terrible losses to our fishermen, threatening the extinction of an industry already too little remunerative; and, in a spirit of despair, suggested dynamite, and the establishment of factories, as in the United States and Canada, for utilizing the fish for its by-products — oils, albuminoids and glucose — and its residue for land fertilization. The Devon fisheries committee joined the Cornish, and there has been a conference at Plymouth; but little has come of it except the passing of a resolution calling upon the government to do something. Men are now fearful of casting their nets in the home waters until April next, when the "plague" should disappear, silently and mysteriously, in obedience to some law not yet ascertained by our marine biologists.

One suggestion, palliative at best, is the employment of small government steamers to drag the home waters with specially prepared wire nets, which the picked dog cannot destroy with its sharp "spurs," and so insure peaceful fishing to drifters in sheltered bights and bays; for our fishers will not hear of dynamite or any downward explosive on their fishery grounds.

The preservation of the fishing industry is in very truth a matter of national concern. Every village on our coast is a nursery for seamen for the royal navy, and rears a population next to impossible to produce under the totally different conditions of atmosphere and employment in towns. The hereditary instincts of seamen are the slow growth of centuries, and discovery will come too late, if once our fishers are compelled to adopt other occupations, — a contingency which looms nearer every season of failure and disaster. At present our navy and naval reserve are recruited largely from the fisher class.

Cannot the dreaded dogfish, the glutton of the sea, become a welcome guest, and, instead of being treated as a waste product of nature, be converted into cheap food for the masses? A brisk demand for it as an edible would dispel the gathered and still gathering gloom. Our fishermen would catch it with special net and hook, if only it could be sold at fairly remunerative prices. At present the dogfish finds its way principally to fried-fish shops; but if once known for the excellent table fish it is, for the low price at which it can be delivered in London and great industrial centers, it would be welcomed by thousands to whom strict economy in living is a first necessity. At Brighton and the Isle of Wight the fish is well known, and it is sold in many places under various names, at prices which would make our fishermen's eyes glisten. The name "dogfish" is said to be against the fish for the tables of persons accustomed to something more euphonious for their menus; but if it became the vogue, the fishmonger might be relied on to dissipate prejudice on that score.

From now until April, at least, an unlimited supply of dogfish can be sent to market from the west, at rates which should be of the first importance to the necessitous, to the unemployed, and to all persons charged with the administration of charitable relief. Its consumption would benefit our fishermen, and make them anxious to catch instead of avoiding the dogfish, so thinning its ranks. It would also add, on the average, two remunerative working months to each year.

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Other Commercial Possibilities.

It is of interest to note that many sea-food canning factories were established in Japan to furnish supplies for the army. Canned dogfish is one of the staples. With the close of the war an outlet must be found for the product of these canneries. Considerable dogfish is also packed in Canada for export to the Western Islands and to the West Indies.

It does not seem probable that in New England and the Middle Atlantic States any favorable market can be developed for dogfish as food; and no encouragement should be given to put dogfish on the market under the name of halibut or other staple fish, or under any misnomer whatever. The supply of staple fresh fish is at present abundant, adequate, and satisfactorily cheap in price. There are in Massachusetts few canneries where the fish might be utilized; though in the States to the south of us dogfish might be canned when oysters, etc., were not available for the canneries. In this section the demand rather points towards currying oil, poultry food and fertilizer; and the logical plan would appear to be the development of some economical method of making the catching and sale of both large and small dogfish sufficiently remunerative to induce the fishermen to bring in the dogfish along with the cod, haddock, pollock, mackerel and other valuable fish.

Some further commercial possibilities are referred to in the report of Mr. Paul M. Carpenter. Here Mr. Carpenter supplements his observations on board the fishing vessels and at handline fishing at Provincetown, by calling renewed attention to the report of Mr. Charles N. Stevenson on "The Utilization of the Skins of Aquatic Animals," annexed to the report of the United States Commissioner of Fish and Fisheries for the fiscal year ending June 30, 1902.

Dr. George W. Field, *Chairman, Commission on Fisheries and Game.*

Dear Sir: — On June 24, 1905, I was appointed an agent of the Massachusetts Commission on Fisheries and Game, for the purpose of investigating the food of certain deep-sea fishes, particularly of the dogfish, and to collect any information upon the damage done to the fisheries by dogfish or other predatory fish. I at once entered upon the discharge of my duties, establishing my headquarters at Provincetown. I have devoted my attention chiefly to the study of the dogfish and his

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habits, this fish having of recent years become a serious menace to the fisheries of the Commonwealth.

The attention of the United States Fish Commission was first called to the rapid increase of dogfish in Atlantic waters in February, 1882, by Capt. J. W. Collins, then attached to the United States Commission on Fish and Fisheries at Washington, and later, until his lamented death, the accomplished chairman of the Massachusetts Commission on Fisheries and Game. In a letter to Prof. S. F. Baird, then United States Commissioner, Captain Collins wrote: —

In the "Cape Ann Advertiser" of Feb. 18, 1882, I find the following paragraph: "Immense schools of dogfish, extending as far as the eye can reach, have appeared off Portsmouth, an unusual sight in winter." Is it not possible that the presence of dogfish in such abundance in that vicinity, this winter, may have something to do with the scarcity of cod in Ipswich Bay? It is a fact well known to fishermen that dogfish in summer will drive the various species of bottom fish from the grounds, and it may be that they are quite as voracious and troublesome to the cod in winter as in warmer weather.

Again, two years later, Captain Collins called the attention of the government to this matter, in a letter dated July 7, 1884, in which he wrote: —

Capt. Joseph Smith of Gloucester, Mass., tells me that while off Wood Island, Me., in August, 1880, he observed what he supposed to be at first a moderate-sized school of mackerel, at the surface of the water. On closer inspection, however, he found that only a small number were mackerel, probably not exceeding half or three-quarters of a barrel, and these were completely surrounded by an immense school of dogfish. The body of dogfish was formed in such a manner as to enclose the mackerel on all sides and underneath, completely preventing their escape. Captain Smith had an opportunity of observing the mackerel closely, and says that many of them he noticed were bitten by the dogfish, some being deprived of their tails, and others having wounds on their sides. He is of opinion that every one of the mackerel was ultimately eaten by the dogfish. It is probable, he thinks, that at first a much larger body of mackerel was surrounded. The school of dogfish he estimated to contain at least enough for 100 barrels. Another school of dogfish, surrounding a small body of mackerel, was seen on the same day.

Annexed to the annual report of the United States Commissioner of Fish and Fisheries, for the fiscal year ended June 30, 1903, is a report by Mr. Barton W. Evermann, assistant in charge of the Division of Statistics and Methods of the Fisheries. In discussing the dogfish Mr. Evermann says: —

Dogfish appeared on the coast in and near Penobscot Bay in unwonted numbers in 1902, and committed great havoc among the deep-water fishes. They appeared earlier than usual, being found near Monhegan Island as early as the middle of May, and becoming quite plentiful all along the coast in June; but August appears to have been, as usual, the month of the greatest abundance. As illustrating their abundance, and the damage wrought by them to the shore fisheries, Mr. John N. Harriman of Stockton Springs, who fishes a great deal in the lower Penobscot Bay, near Matinicus, at Isle au Haut, etc., stated that he never knew dogfish so plentiful. They came into the bay early, about June 1, and remained until late in the season. A Searspot fisherman also caught dogfish just outside of Brigadier Island. Mr. Alvah G. Dorr of Bucksport, who fishes for haddock, cod, etc., near Gott's Island,

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found dogfish troublesome about the last of June. Around Mount Desert Rock the large fleet of fishermen usually at work there were all driven from the fishing ground by the dogfish early in July, and had hardly begun again September 9. The dogfish not only seize the bait on trawls, but attack other fish that have been hooked. On August 9 Mr. Dorr set his usual trawl, 1 tub of 500 hooks, about 1 mile outside of Gott's Island, and secured at one haul 217 dogfish, 5 haddock and a good many heads of haddock, of which the rest had been eaten off by dogfish. On the same day another man fishing in that locality, with about the same number of hooks, caught in one haul 224 dogfish, 2 hake heads, and 3 skates. Mr. Dorr opened perhaps half a dozen dogfish, and found that nearly all were females, with living young within, about 8 fish to each mother, which would swim off on being thrown into the water. In the Penobscot River, near Sandy Point, a trawl set by Mr. Ernest A. Partridge of Stockton Springs, in 15 fathoms of water, took 50 dogfish in one day. Occasionally, but not very often, dogfish are caught in salmon weirs. The fishermen report 9 dogfish caught in weirs at Stockton Springs, 6 at Penobscot and 9 at Verona.

In the summer of 1904 the dogfish became unusually and remarkably troublesome to the fishermen of Cape Cod. Capt. Benjamin R. Kelley of Provincetown, a fisherman of much experience, found them far more plentiful in that vicinity than ever before. They made their appearance in large numbers, he says, about the middle of July. They were very large and voracious, and were so destructive of nets and gear that near the end of July many of the fishermen were obliged to take up their nets and trawls, dry them and store them away, in order to save them from destruction. Some of the larger vessels reported the loss of hundreds of dollars' worth of nets and trawls destroyed by dogfish. Before the close of the season it became impossible to keep a hook on the bottom for ground fishing, the dogfish not only destroying the fish on the trawls, but devouring the bait and destroying the gear. In the south channel, southeast of Noman's Land, these fish were especially numerous and troublesome, seriously reducing the value of these fishing grounds. Lobster men also reported much annoyance from the dogfish, which would enter the pots and consume the bait. Frequently 4 or 5 dogfish would be found in a single lobster pot. The mackerel, once so plentiful in Cape Cod Bay, in the season of 1904 were quite scarce, the scarcity being due, in the opinion of the fishermen, to the presence of the dogfish in so great numbers.

Upon examining the edible fish caught on the trawls, it was noticeable that, contrary to the reported habit, comparatively few presented the appearance of having been attacked by dogfish. From these facts stated, together with the additional fact that many of the dogfish caught appeared to be not fully grown, I concluded that the pugnacious nature of the dogfish does not develop until he approaches maturity. I found no trace of lobsters or shellfish in the stomachs, although the occasional presence of large deep-sea scallops on the trawls was evidence of an abundant supply of these shellfish at the depth reached by the trawls.

Although the month of August is the time of year in which the dogfish may usually be expected to be the most annoying, the reports from all the fishermen indicated a far less number than usual in the vicinity of Cape Cod. In numerous trips which I made to the Ledge and other fishing grounds within a day's sail of Provincetown,

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experience indicated much less annoyance than usual to the fishermen from this cause. Reports were persistent of the presence of dogfish in great numbers off the coasts of Maine and Nova Scotia. This report, taken in connection with an unusual scarcity of mackerel in Cape Cod Bay during the past summer, was taken by fishermen as an indication that the mackerel had fled to the eastward, pursued by the dogfish.

In August I visited the United States biological station at Wood's Hole, and there learned that conditions similar to those at Cape Cod, relative to dogfish, prevailed at that point.

The fishermen of Provincetown were also perplexed and annoyed by an unusual scarcity of squid, which is commonly found in great numbers in the harbor, and which is used generally for bait. Many vessels were detained in port for a large part of the season by the difficulty of procuring this bait. Others used porgies or herring for bait, although squid is preferred. It is not impossible that some connection may be traced between the scarcity of dogfish and that of squid in the vicinity of Cape Cod, for it is certain that the dogfish is fond of the squid as food.[1] In the summer of 1902 an immense school of squid, pursued by dogfish, took refuge in the shallow parts of Provincetown harbor, and was left on the shore by the receding tide. So enormous was the number of these stranded squid that the board of health of the town found it necessary to employ a large number of men to remove the bodies, in the interest of the public health and comfort.

The report of the appearance of dogfish in great numbers on the Maine coast is confirmed by an article published in a New York newspaper, annexed to this report (see p. 166), which describes these fish as swarming in immense numbers in the vicinity of Old Orchard.

I beg to call the attention of the commission to some considerations respecting the utilization of dogfish for commercial purposes.

Annexed to the report of the United States Commissioner of Fish and Fisheries, for the fiscal year ending June 30, 1902, is a report of Charles H. Stevenson on "The Utilization of the Skins of Aquatic Animals." Concerning the utilization of the skins of sharks, rays and dogfish, Mr. Stevenson says: —

> The skins of sharks, rays and dogfish are commonly very rough, and studded with numerous horny, tuberculous markings or protuberances. Some have small imbricated and triangular scale-like tubercles; others unimbricated and nearly rhomboid, which in one species ranged near each other in quincunxes, or they may be quite square, compact, and comparatively smooth on top. These protuberances are usually firmly fixed to the skin, so that they are not easily separated therefrom. They are rough and hard, and take a polish almost equal to stone.
>
> These skins, like those of all cartilaginous fishes, are very durable. A peculiarity, in addition to the markings above noted, is the non-porous character. The pores that are everywhere present in the skins of most mammals, which give the natural grain in the tanned leather, are entirely indiscernible in the skins of these fish. The result is to render them almost proof against water absorption. Although by skillful tanning the fibres of seal and other skins may be plumped and the body of the membrane solidified, yet much water exposure loosens up the fibre and gradually permits absorption. Not being of a porous nature, shark skin is

[1] We found at Canso, N. S., a remarkable scarcity of squid, but an astounding abundance of dogfish. — G. W. F.

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naturally free from this defect. But the advantage is also a disadvantage in some respects. The non-porous leather is practically air proof as well as waterproof, and that is a serious defect when its use for footwear is considered. Beyond this, the skins of sharks and similar fishes may be prepared in a very durable, non-cracking leather, for which many uses may be found.

Formerly, large quantities of these skins were used for polishing wood, ivory, etc., for which they are excellent, owing to their roughness, hardness and durability. But the great improvements made in preparing emery compositions and sandpapers have resulted in substituting them almost entirely for polishing purposes. However, a small demand yet exists for shark skins for cabinet workers' use.

The principal uses made of the skins of sharks and allied fishes at the present time are for covering jewel boxes, desk ornaments, card cases, sword sheaths, sword grips, and a great variety of small articles for which the tuberculous markings peculiarly adapt them. The demand for these purposes, however, is small and restricted, and each producer has to develop his own market. Comparatively few of these skins are prepared in the United States, and diligent search among the tanneries and leather stores will result in the finding of only a few skins. Many, however, are prepared in France, Turkey and other countries in southern Europe, and also in China and Japan.

A Parisian manufacturer has made quite a reputation tanning the skin of a species of Malabar shark into morocco; and establishments in Turkey make green leather from the skin of the angel shark found in the Mediterranean Sea. The skin of the diamond shark obtained in the North Sea, and so called because of the shape of the markings or protuberances, is used to cover the sword grips of German officers, and for this purpose is not surpassed by any material obtainable. Some parts of the skin of certain varieties of sharks, when dried and hardened, take a polish equal to that of stone, and bear a strong resemblance to the fossil coral porites, and are much used in the manufacture of ornaments and jewelry.

In preparing them for the use of cabinet makers, shark skins are merely cleaned, and not tanned. The hard, dry skins are soaked in lukewarm water for three or four days, shaved on the flesh side to remove surplus flesh and muscular tissue, and then dried. The skins of some species of sharks are so hard that they cannot be shaved. The appearance of these skins is improved by bleaching, using chloride of lime and sulphuric acid. The durability of some of them is remarkable, outwearing many sheets of sandpaper of equal area.

In tanning shark skin for leather or ornamental purposes, an alum process is usually employed. Each establishment usually has its own particular method, but the general process is much the same, consisting of a preliminary soaking, liming, bating and fleshing, and then tanning or preserving in an alum compound. The hard skins are first soaked in water four or five days, and then in lime water for two to six days, depending on the condition of the texture, temperature of water, etc. The skins are washed free of lime and bated in bran water, then shaved on the flesh side, to remove all excess of flesh and the like. The alum solution in which they are immersed is composed of a pound of alum and one-fifth of a pound of salt to a gallon of water. The skins remain in the solution two or three days, with occasional stirring. On removal they are dried and are then ready for manufacturing.

The subject of the utilization of dogfish for oil and guano is briefly discussed by Mr. B. Frank Gallup of East Boothbay, Me., in a letter to Prof. S. F. Baird. Under date of Sept. 26, 1882, Mr. Gallup wrote: —

Allow me to call your attention to a new industry, started this season on this coast upon scientific principles, and which promises to be a success, providing there is a bounty allowed to fishermen. I refer to the catching of dogfish and making them

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into oil and guano. I have paid this season $1 per 100 fish, and the fishermen claim that the price is too low; yet it is all that I can afford to pay for them, — in fact, all they are worth. My views are that, if the fishermen receive a bounty in addition to the above price, many more would engage in the business, and add their mite to ridding the ocean of these destructive fish. I have this season converted the porgie factory, formerly owned by Gallup & Holmes, into using the fish, and can handle during their stay here say 1,000,000 fish, besides being instrumental in destroying twice that number in young fish, nearly matured.

I beg leave to add that some years ago an establishment was, so I am informed, put into operation at Provincetown for the rendering of oil from dogfish; but the oil so procured proved of so poor a quality that its production did not prove commercially profitable, and the establishment was closed.

I also beg leave to annex to this report a newspaper clipping, which concerns a single phase of the subject treated in this report.

Very respectfully, PAUL MOULTON CARPENTER.

ENEMIES OF FOOD FISH. — MAINE TRAWLERS COMPLAIN THAT THE DOGFISH IS DRIVING THEM FROM BUSINESS.

[From the "New York Sun."]

The hotels at Old Orchard, Me., have been driven to the conclusion that their supply of fresh fish will have to come from a distance this season. The schooners which used to circuit about the bay do not now seek the mackerel and porgies. Some visitors saw the cause of the trouble a few days ago, in Casco Bay. They had gone out with a couple of old fishermen for a night's trawling. Some new lines had been carefully set, and then the buoyed half mile of line put out a day or two previously was visited. Hardly, however, had the two begun to pass the heavy cord with its dependent lines over the roller in the bow of the boat, when one of them began to swear, and wound up by saying, "No use; I guess dogfish have spoiled the whole thing."

As line after line came up, it was found that all the bait was gone and most of the hooks missing, and many of the cords broken off short. There is no chance to catch one of the thieves at such times, the men explained, when one of them has been hooked in such a manner that he cannot cut the line with his hundred of wedge-shaped teeth. When once the tough skin of the brutes is broken, so that the blood comes, the other dogfish will scent the carrion from an incredible distance, and hurry to the feast.

Near Prout's Neck at the east corner of the beach the school was seen a day later from a coasting schooner. They were chasing an immense drove of small mackerel, young cod and porgies, which were leaping out of the water in every direction, in vain endeavors to escape the implacable enemy. There was some generalship about the attack. The fish were headed into a little bay with rocks at each of its points. The school of dogfish were in a crescent formation, completely cutting off all retreat in the shallow water. The food fish quite realized their hard fortune, and many tossed themselves against the rocks or on to the shore, to escape the teeth of their pursuers. The flashing of the gleaming bellies as the dogfish turned themselves to give play to the mouth

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under the pig-like snout was incessant, and like short sticks the back fins stood above water almost as far as one could see.

No one who has not seen them would believe the immense size of these schools of dogfish, or mackerel sharks, as some of the coast fishermen call them. The fishermen say that until a few years ago a pack of 50 would be a large body; now they travel in thousands.

To the ordinary whales and large sharks the men are not unfriendly. These are the big dogs which bring the flocks in where the nets and trawls can get them, for the way of escape from these giants is by the shallow waters. But the dogfish drive them away from the in-shore fishing places to places where the fishermen cannot get at them.

When first taken out of the water they are pretty enough, so far as appearances go. About 5 feet in length, of true shark formation, with straight dorsal fin sticking up some 20 inches, a mouth like a new moon some inches back underneath the snout, of a lovely dark-blue color, shading to white below, long and lean, they have all the lines of aristocratic racers.

All along the coast there are vague grumblings of the need of government intervention. The Canadian government is subsidizing factories which will convert the little sharks into fertilizer. But there does not seem to be very much promise in these attempts.

Suggestions have been made that a good export trade with Europe could be built up in the canned flesh of the pests. The flesh is not at all bad when boiled, and so far as is known the dogfish are not unclean feeders. Possibly it may yet pay the fishermen to catch them and sell them to the canners.

The skin of the dogfish is strong, and as rough as a carpenter's rasp. Small quantities of it are tanned and used for the grips of fine swords and dirks. A few ladies' reticules have also been made from it. If the natural color of the living fish could be retained, there could be no prettier covering for handbags, valises and small trunks, and one would imagine it would be as easy to set a fashion in it as it was in alligator skin.

Conclusion.

In closing, renewed emphasis should be laid upon the importance of devising and putting into practical operation some plan whereby the fishermen may receive proper remuneration for the time, labor and capital necessary to bring the dogfish ashore, where the bodies may be made of economic value, thus, by killing, to check the increase of this destructive fish, which is rapidly becoming an additional "white man's burden."

Whatever system may be adopted for controlling this evil cannot be expected to exterminate the dogfish. Yet, if the problem is thoroughly canvassed in all its details and wisely worked out, unquestioned economic value can be attained at a cost merely trifling, when ranged alongside the accruing benefits.

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From the wide distribution of the dogfish and its migratory habits, a union of efforts along similar lines will be most advantageous; thus with our northern neighbors, Canada and Newfoundland, we have reciprocal interests in this matter, even if we have no treaties of reciprocity. The type of continental free trade carried on by the dogfish race is immensely prejudicial to the productive economic capacity of the ocean, and must be controlled by as rigorous efforts as are applied to terrestrial pests. The information which we have secured in the preparation of this report compels us to range ourselves with those who are of the opinion that these matters demand national consideration. The actual amount of damage done to the Massachusetts fisheries is a serious handicap to the prosperity of an industry which is a great source of national wealth, and the nursery of our national navy. Similar conditions obtain in Newfoundland, Canada and Great Britain, and are of sufficient importance to warrant an international commission, which may determine upon a concert of effort to control this economic plague.

Finally, we call renewed attention to the following facts: —

1. The annual damage by dogfish to marketable fish and fishing gear owned in Massachusetts is not less than $400,000 (see pp. 115, 116).

2. This damage falls directly upon the fishing industry, but indirectly and ultimately upon the purchasing public.

3. The inroads of the dogfish upon the profits of the fishermen have at present a decided tendency to drive capable men from our maritime industries. If this continues, the difficulty of securing men for the navy will be greatly augmented. (Massachusetts now furnishes more men than any other State except New York.)

4. This damage is not confined to the coast of Massachusetts, but extends over practically the entire coast of the North Atlantic Ocean. The Dominion of Canada has already made a substantial move. Under the direction of its Department of Marine and Fisheries three dogfish reduction works have been established, for securing oil and fertilizer from the dogfish. The industry of canning dogfish for food is being fostered by the same department, and is developing with abundant promise of success.

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5. On our Atlantic coast are numerous glue manufactories and menhaden rendering plants, where dogfish could be converted into oil and fertilizer, provided the catching and transportation of dogfish could be made to yield a living profit.

6. The theory and practice of subsidies and protection to "infant industries" is prominent in the development of these United States. Our fishing industry is to-day sorely in need of a small degree of protection, through a subsidy, bounty or other governmental assistance, whereby an industry may be established which shall make the capture of dogfish as profitable as is the capture of the staple market fish.

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REPORT OF THE COMMISSIONERS ON
FISHERIES AND GAME

UPON

THE LOBSTER FISHERIES

AND THE

CAUSES OF THEIR DECLINE.

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THE LOBSTER FISHERIES.

Is the Lobster actually threatened with Commercial Extinction?

If reliance should be placed merely upon the market reports to answer this question, the probability is that the dealers' almost universal answer, "There are just as many lobsters in the market to-day as there ever were," would be accepted as a true index of existing conditions. If, however, we should take a broader survey, and study the conditions in Massachusetts from 1888 to 1905, inclusive, as are shown by the sworn statements of the fishermen of Massachusetts, we would face evidence that the total number of lobsters caught in Massachusetts has declined in the last fifteen years, or since 1890, from 1,612,000 to 426,000; and this, too, notwithstanding the use of the most approved apparatus, *e.g.*, power boats which permit a far wider fishing area, and the stimulus of higher prices which have caused notable extension of the fishing season, *e.g.*, in Maine the lobster fishery is now carried on during every month of the year, instead of during seven or eight months, as formerly.

Official reports from the hatcheries, too, indicate a gradual yet positive decrease in the number of egg-bearing lobsters which can be secured. The aggregate number of egg-bearing lobsters given in the sworn statements of the fishermen was 9,865. This is the basis upon which the figures given for 1888 and the subsequent years were made. This would indicate a tremendous decrease in the number of breeding lobsters, from 70,909 in 1890 to about 10,000 in 1905.

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Date.	Fishermen.	Traps.	Number of Lobsters above Ten and One-half Inches.	Egg-bearing Lobsters.	Average Catch per Pot.
1888,	367	21,418	1,740,850	-	81
1889,	344	20,016	1,359,645	61,832	68
1890,	379	19,554	1,612,129	70,909	82
1891,	327	15,448	1,292,791	49,973	84
1892,	312	14,064	1,107,764	37,230	79
1893,	371	17,012	1,149,732	32,741	62
1894,	425	20,303	1,096,834	34,897	54
1895,	377	17,205	956,365	34,343	56
1896,	453	22,041	995,396	30,470	45
1897,	388	18,829	896,273	23,719	48
1898,	340	16,195	720,413	19,931	44
1899,	327	15,350	644,633	16,470	42
1900,	309	14,086	646,499	15,638	46
1901,	331	16,286	578,383	16,353	35
1902,	410	20,058	670,245	-	34
1903,	309	20,121	665,466	-	33
1904,	326	19,539	552,290	13,950	28
1905,	287	13,829	426,471	9,865	31

Department of Commerce and Labor, Bureau of Fisheries,
Gloucester, Mass., Nov. 8, 1905.

Dr. George W. Field, *Chairman, Commissioners on Fisheries and Game.*

Dear Sir: — I submit herewith a brief report of the propagation of lobsters during the current year.

The results of the season's work were very unsatisfactory. Not only was there a large falling off in the collections of egg lobsters, but the quality of the eggs was very poor, causing a much heavier loss than in any previous season. The eggs were not as far advanced in development as in past seasons, and were a month late in beginning to hatch. The eggs also appeared flabby, and lacking in vitality. The severely cold winter doubtless had a great deal to do with these conditions.

The total collections in Massachusetts aggregated 1,450 egg lobsters, which yielded 22,721,000 eggs, — a decrease of 30 per cent. from last year. There were 16,880,000 fry hatched and distributed at various points along the Massachusetts coast.

Appended will be found tables showing the collections from the

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several fishing centres covered by our collecting operations, and the distribution of fry.

Very respectfully,

C. G. CORLISS,
Superintendent.

Collections of Egg Lobsters in Massachusetts, 1905, Gloucester, Mass., Station.

LOCALITY.	Egg Lobsters	LOCALITY.	Egg Lobsters.
Gloucester,	174	Boston harbor, including Hull,	256
Lanesville,	59	Boston dealers,	407
Rockport,	363	State boat "Egret,"	139
Salt Island,	40	Total,	1,450
Beverly,	12		

Distribution of Lobster Fry in Massachusetts Waters, from Gloucester, Mass., Station, 1905.

DATE OF PLANT.	Point of Liberation.	Number of Fry planted.
June 24,	Off Salem,	100,000
24,	Off Marblehead,	400,000
26,	Off Gloucester,	600,000
July 1,	Off Salt Island,	750,000
3,	Off Gloucester,	500,000
8,	Boston harbor,	1,250,000
8,	Off Gloucester,	1,200,000
11,	Off Scituate,	2,400,000
12,	Off Gloucester,	600,000
15,	Off Rockport,	1,200,000
18,	Off Beverly,	1,000,000
19,	Off Annisquam, in Ipswich Bay,	1,400,000
20,	Off Gloucester,	1,000,000
21,	Off Manchester,	1,200,000
22,	Off Gloucester,	1,100,000
23,	Off Beverly,	1,000,000
24,	Off Rockport,	850,000
26,	Off Rockport,	330,000
Total,		16,880,000

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DEPARTMENT OF COMMERCE AND LABOR, BUREAU OF FISHERIES,
WOODS HOLE, MASS., Jan. 23, 1906.

Dr. GEORGE W. FIELD, *Chairman, Commissioners on Fisheries and Game.*

SIR: — Herewith I submit a brief report of the lobster work done at this station during the season of 1904–05.

Early in the season it was decided to try the experiment of collecting about 500 egg-bearing lobsters in the fall, and holding them in live cars floated on the surface. One hundred were placed in two cars and sunk to the bottom of the harbor, part of them being in about 18 feet and the remainder in about 35 feet of water. Three hundred lobsters were placed in live cars, which were floated on the surface during the entire winter. These cars were moored in the outer basin at the station, and during part of the winter this basin was covered with ice over a foot thick. One hundred of the lobsters were liberated in the small basin at the station, and nearly all escaped, only 6 being taken out in the spring. The cars which were sunk to the bottom lost about 25 per cent. during the winter. In all, 292 lobsters were recovered in the spring, and these yielded 2,929,000. The eggs seemed to be of good quality, but did not hatch as soon as others which were collected in the spring from waters of this State, being from one to two weeks later. The total number of eggs received at the station was 17,404,000, and from these 13,016,000 fry were hatched. Of these, 3,132,000 were planted in Connecticut waters and the remainder in the waters of this State. In all 707 lobsters were received from the waters of this State; 105 of these were collected by the employees of this station, the remainder being shipped to us by the employees of your department.

Respectfully,

E. F. LOCKE,
Superintendent.

The following is an abstract of the report of Deputy Foster, of the launch "Egret," in the lobster work. The "Egret" went into service April 26, and was hauled up for the winter on November 29. During this time she ran 447 hours, covering 4,693 miles; collected 2,602 egg-bearing lobsters, of which 1,393 were over 12 inches and 1,209 less than 12 inches, 129 under 10½ inches; liberated 968, 10 died during transportation, sent to Woods Hole hatchery 1,079 (670 were over 12 inches, 409 less than 12 inches), sent to Gloucester hatchery 537 (328 over 12 inches, 209 less than 12 inches).

Received the following lobster fry from Woods Hole hatchery: —

On June 7, 600,000, which were liberated as follows: 240,000 off Davis Ledge, near Minot's Light; 240,000 off Scituate; 120,000 near whistling buoy off Plymouth.

On June 14, received 1,000,000, which were liberated as follows: 285,000 near Harding's Ledge; 330,000 inside Minot's; 385,000 off Scituate.

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Lobster trap commonly used in Cape Breton.



Lobster cannery of H. E. Baker, at Fourchu, Cape Breton.

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July 1, received 1,600,000, which were liberated as follows: 400,000 near Graves Ledge; 600,000 three quarters of a mile south-southwest from Fawn Bar buoy; 200,000 near Thieves' Ledge; 400,000 near Point Allerton buoy.

From the Gloucester hatchery we received the following fry: —

June 24, 1,000,000, which were liberated between Baker's Island and Pig Rocks.

July 8, 1,250,000 fry, liberated between Pope's Head and Nahant.

July 11, 2,400,000 lobsters, which were liberated between Scituate and Boston Light.

We have let go 580 adult lobsters from hatchery between Eastern Point and Nahant, 430 between Scituate and Boston Light, 205 around Boston islands.

Condition of the Fisheries elsewhere. — Reports, official and from the press, from the Straits of Belle Isle to the Delaware Capes, the entire lobster-producing coast, are well-nigh unanimous, both that the number of lobsters is decreasing and that the average size of the individuals is gradually diminishing. Prof. E. E. Prince, F.R.S., Commissioner of Fisheries of the Dominion of Canada, in 1896 wrote: —

In the Dominion of Canada there remains the last great lobster fishery of the world, and it is not too much to say that this fishery has reached a critical stage.

The signs of exhaustion are unmistakable. Small, immature lobsters, 5 to 8 inches long, which a few years ago were rejected with contempt, are now eagerly taken, and form, in some districts, the staple article on which the lobster canners depend. Instead of two or three lobsters sufficing to fill a one-pound can, not less than five, six, seven and even ten lobsters are now required.

Ten years ago the average size of lobsters was 10 inches (2 pounds weight), while thirty years ago an old fisherman testified that 13 inches (3½ pounds weight) was the average.

In order to keep up the catch each season, the quantity of gear is being increased year by year all around the coast, yet the average number of lobsters taken per trap has been steadily diminishing.

A prominent packer in Prince Edward Island publicly stated that at one cannery the number of cans packed, as compared with the number of traps operated, revealed that during a period covering six seasons the average number of one-pound cans to each trap was 24 in 1891, 16¾ in 1892, 13⅓ in 1893, 12½ in 1894, 7⅓ in 1895 and 5½ in 1896.

This kind of thing cannot continue; and the utilization of berried and soft-shelled lobsters is indicative of the desperate means resorted to to maintain an average pack.

The Bangor "Commercial," under date of May 1, 1905, says: —

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The outlook for lobsters along the Nova Scotia coast is that they will be the scarcest ever known, was the statement made by Capt. J. P. Burns of the lobster smack "Etta M. Burns," which arrived in Portland Wednesday morning with a trip of 12,000 fine, large live lobsters. Captain Burns said that the fish are much scarcer than ever before. There are more smacks here than usual, and more dealers are going into the business.

The Boston "Transcript," on Sept. 5, 1905, says: —

Noank, Conn., September 5: Lobster fishermen in this locality report that the season has thus far been unsatisfactory. The yield of lobsters has been small, even smaller than the harvest of last year. Unless some large catches are made during the few remaining weeks of the season, many of the lobstermen will get no profit whatever from the summer's business. The only condition which has been favorable has been the high price which the lobsters have commanded.

Similar reports could be quoted indefinitely that the same conditions of decline obtain in Maine, New Hampshire, Connecticut, New York and Rhode Island, though in the two latter States the number of lobsters actually caught in the waters of each State cannot be accurately ascertained, for the figures include great numbers of 9-inch lobsters caught in the waters of Massachusetts, Maine and Nova Scotia, and marketed in Rhode Island and New York; thereby an apparently increased catch may be indicated.

It is difficult to conceive a more fallacious argument than the common one that the quantity of fish caught, as represented by the reports of the transportation companies and of the market, is the most accurate indication of the quantity of fish in the ocean. The all important factor in such reports, and one which is usually totally ignored, is the number of men, the amount of gear required to make this catch and the aggregate number of days of fishing. If an annually larger number of men and an increased quantity of gear, working a greater number of days, are necessary to meet the market demand for a specific number of pounds, it can indicate nothing less than correspondingly temporary or permanent contraction of the source of supply; and the market reports of a larger number of lobsters caught is but a more certain proof that the number of lobsters remaining as breeders is thereby still further diminished.

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Perhaps the most conclusive evidence is that furnished by actual personal observations of competent persons, whose judgment is unswayed by pecuniary interests. The statement made by our late chairman, Captain Collins, is of value here, as typical of the observations of nearly every one who has familiarly known any particular stretch of sea coast for the past thirty or even twenty years: —

You have been told how easy it was, before the lobster fishery began on the central coast of Maine, — say about 1847 to 1849, — for a boy to pull big specimens of the species from under boulders along the seashore. At that time the waters of that section swarmed with lobsters; the supply seemed inexhaustible; in the inner reaches, among islets and ledges where now it would be of little use to set pots, lobsters could be taken in large numbers fifty years ago. So near were the fishing grounds to where I lived that on one occasion my brother and I hauled our pots in a southeast gale. Where we could get from five to a dozen lobsters to a pot in those days it would now be difficult to catch one in a dozen pots. Those were the days when smacks from Noank, New London and elsewhere frequented the harbors of Maine in search of cargoes of lobsters for the markets of Boston and New York, chiefly those of the latter city.

Then came the destructive canneries. We are familiar with the result of the introduction of the canning factory on the coast of Maine. The influence of it was to gradually reduce the number and size of lobsters. Finally, the canning of lobsters along the coast of that State was stopped.

It was first limited by law in 1897, and the time each year during which canning could be prosecuted was reduced from time to time, until this form of packing could be carried on only from April 1 to July 15, the balance of the year being close season, so far as the canneries were concerned. In this respect the regulations were similar to those now in force in Canadian waters, but they did not avail to delay perceptibly the decadence of the lobster. In 1879 and 1880 I visited nearly every harbor and cove along the coast of Maine, and interviewed hundreds of lobster fishermen. Already there were complaints of a scarcity of lobsters, for, notwithstanding a large increase in gear, the catch per man was not so much as formerly. All this is a matter of history. Still, the yield of the Maine fishery in 1880 was 14,234,182 pounds of lobsters; at present it is only a little in excess of 10,000,000 pounds, although in the mean time the material increase in the price of the lobster has caused an enormous increase in apparatus employed, and also a considerable increase in the numbers of the fishermen.

And again: —

In 1887, when I was at Seldom-come-by harbor, at Fogo Island, off the east coast of Newfoundland, an old fisherman came alongside of the

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"Grampus" with a lot of large lobsters that he had gaffed from beneath the boulders along the shore just outside of the sea-wash. Mr. Fred. A. Lucas of Washington, who was with me at the time, as a scientist from the United States National Museum, was in the same region last year [1902] on official business, and he informs me that where the incident I have related occurred the lobster is now very scarce.

Your commissioners have personally inspected many points on the coast of Nova Scotia, Cape Breton, Prince Edward Island, Magdalen Islands and Newfoundland, where the lobster fishery is carried on; and even here, in the very heart of the greatest lobster fisheries of the present day, the opinions of the future of the lobster industry are decidedly pessimistic, if the present methods are continued.

As a result, therefore, of a most judicial and open-minded desire to obtain true facts, we are forced to conclude that there are fewer lobsters in the ocean to-day than there were fifty or even ten years ago. This is true throughout the entire range of the lobster. In the neighborhood of the great markets of New York and Boston the decline is most obvious. In actual numbers there are probably not more than one lobster to-day, where there were ten fifty years ago. But the most alarming fact is that the capacity of the race to rehabilitate itself has been tremendously impaired through the diminished average size of the lobsters at present living. For this reason the total number of lobster eggs annually produced is markedly less than formerly; *e.g.*, an 8–9 inch lobster produces on an average 5,000 eggs; a 13–14 inch lobster produces 30,000 to 40,000 eggs at one laying. Therefore thirty years ago, when the lobsters averaged above 13 inches long, the egg-production was as an average at least twice to four times what the average female lobster produces to-day, when the size of the lobsters which are taken in the traps averages about 9 inches, or even less. From this it is obvious that it will require a closed season of a long period, say not less than five years, for the lobster race to regain its former productive capacity, and a still longer period before any lasting results can be secured.

The decline has, in our opinion, been rendered less conspicuous through the efforts of the United States Bureau of Fisheries, of the Ministry of Marine and Fisheries of Canada, and of the

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State governments of the New England States, notably Maine, Rhode Island and Massachusetts, to protect and to propagate the lobsters on their coasts.

As a result of our investigations, we are of the opinion that there has been a decided decrease: (1) in the number of lobsters living to-day as compared with ten years or even one year ago; (2) in the average size; (3) in the number caught per pot; (4) in the number of lobsters of breeding age; (5) in the aggregate number of eggs laid, upon which the future of the lobster depends; there is (6) marked evidence of the absence of lobsters from extensive areas where they were formerly numerous.

We are of the opinion, too, that the methods employed up to the present time have been rendered inadequate by lack of attention to certain laws of nature (to which reference is made later; compare pp. 190, 197, 199, 203, 205), and this, too, in spite of the conscientious study and well-considered activity of the officials of the United States Bureau of Fisheries and of the various States, who have earnestly attempted to check the decline, and whose efforts have the confidence and the support of every honest national and State legislator.

Causes of the Decline. — Since this decline is a fact, and not a theory, let us consider the existing conditions surrounding the lobster industry, for within these conditions must exist the causes for the decline, and the decline can be checked most readily by modifying the conditions.

First, let us be so open-minded as to consider the real meaning of the report that the catch of one year exceeds that of the previous year: *e.g.,* reference to the table on p. 174 shows that the catch in Massachusetts in 1890 exceeded that of 1889, that of 1893 exceeded that of 1892, that of 1896 exceeded that of 1895, that of 1900 exceeded that of 1899 and that of 1902 exceeded that of 1901. This does not prove that there were more lobsters in the ocean in one year than another, — it merely indicates that more were caught; the cause of this increase is shown in the table. In each year where an increased catch appears it is found that there was also an increased number of men employed in the catching, except in 1900, where there were 18 men (a relatively small proportion) less than in 1899. No one can rationally contend that an increased catch in any

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one or two years can be an argument to prove an increase in the number of lobsters, especially when the figures for the annual catch prove to-day, in spite of really greater efforts, less than one-third as many lobsters were caught last year than were taken in 1888. In 1902 the yield had shrunk to 1,005,367 pounds, valued, at the then prevailing price of 11 cents per pound, at $110,590.37. The decline is now even more rapid. The catch of 1905 from the sworn returns was 426,471 lobsters, which at the present price of 18 cents per pound were sold by the fishermen for $95,955. A comparison of the returns of 1904 and 1905 indicates that during the past year there has been in the lobster industry of the State a decline of 39 men; 56 boats, valued at $3,893.50; 5,710 pots, valued at $6,376; $478.35 in other property; and, further, a decreased catch of 125,819 lobsters, and an income diminished by $22,065.57. Therefore, we must carefully consider the value of such testimony, and the catch of one season is not a safe criterion.

Conditions introduced by Man responsible. — In the natural struggle for existence the lobster was formerly a dominant animal. Before man became its greatest enemy, there is abundant evidence that the lobster was a favored race. But with the coming of the white man the balance of nature was upset, and the lobster is now decreasing on account of the conditions introduced by civilized man. Such conditions surrounding the present lobsters can be grouped under two heads. (1) The increased market demand, arising from an increasing population and accumulated wealth, with a demand for toothsome dainties, entirely apart from their value as a food. This demand has not been met by a correspondingly augmented source of supply. (2) The other condition introduced by man is the laws in force since 1873, which, although slightly modified in detail, have the same fundamental principle.

The Increased Demand. — The extent of the increased demand is indicated by the fact that the public are willing to pay a price treble and quadruple that of ten years ago; and this in spite of the fact that, on a basis of 20 cents per pound for boiled lobster 10½ inches or over in the shell, the actual cost of the edible meat is not less than 80 cents per pound upon the table of the consumer.

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This increased demand has led to a great development in the methods of lobster fishing; to the use of more traps by a larger number of men, who find that the advancing price compensates for the increasing scarcity of marketable lobsters. By the application of power to sail boats and dories the radius of the fishing grounds is vastly increased, and the labor and the risk from stress and storm much lessened. Improved methods of shipment have been devised, where, by means of ice, tanks and refrigerator cars, lobsters can be satisfactorily shipped two or three thousand miles. The increased demand, too, has led to the selling of a greater number of "short" lobsters. Whether the laws of the States legalize the catching only of those above 10½ inches, or 9 inches, or 8 inches, the catching of "shorts" below any of these figures [1] goes merrily on, in spite of the best efforts of those entrusted with the enforcement of the laws. We found the same state of affairs in Newfoundland, in Nova Scotia, on the shores of the Gulf of St. Lawrence and in the Bay of Fundy, as in New England waters.

Commissioner Nickerson of Maine says: "There is a greater demand for short lobsters to-day than ten years ago."

The ever-increasing number of summer residents on the New England sea coasts, in cottages and in hotels, the multitudes of hungry excursionists from our cities, coming by train, trolley and steamer to the shore resorts, are the direct incentive to the sale of millions of illegal lobsters. A person who is competent to observe and to form a trustworthy judgment estimates that during the summer season of 1905, covering about one hundred days, not less than 1,720,000 short lobsters were sold at the resorts on the shore between Boston and Gloucester. The commission's patrol launch "Scoter" was instrumental in compelling the return of upwards of 900,000 short lobsters to the water during the summer of 1905 in Boston harbor alone.

[1] As an indication of the size of lobsters used by those engaged in the short-lobster trade, the measurements of the "shorts" seized in two cases taken at random are of interest. In one seizure of 58 "shorts," taken south of Cape Cod, the smallest was 6 inches; 14 measured 8 inches or less; 37 measured 9 inches or less; and 7 were less than 10½ inches but over 9 inches. In another seizure of 128 "shorts," taken north of Cape Cod, the largest lobster was 10 inches, the smallest 6½ inches; 48 measured 8 inches or less, 87 measured 9 inches or less and 23 were over 9 inches and less than 10 inches.

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In Maine, Warden N. J. Hanna, who has been a warden for more than twelve years, and who previously had been a practical fisherman, is of the opinion that annually 10,000,000 short lobsters are used as bait for cunner traps, and that over 5,000,000 short lobsters are consumed by the summer visitors, — a total of not less than 15,000,000 "shorts" destroyed in Maine annually; and this does not include "the few taken home by very many fishermen for the use of their own families." The handling of short lobsters has developed into a business, so thoroughly organized that detection and the imposition of fines sufficiently large to make the business unprofitable is a difficult matter. Our judges sometimes fail to recognize the value of a heavy penalty, which, though sometimes bearing heavily upon the individual punished (in many cases the fine imposed is paid by the principals in the business rather than by their agents who have been arrested), would be of the nature of a warning; *e.g.*, the paltry fine of $25 imposed last September upon a notorious violator, who had long been under the surveillance of our deputies, for the possession of 128 short lobsters, was a severe blow to the efficient enforcement of the lobster law.

The schemes for outwitting the deputies and of evading the short-lobster law far excel the peculiar ways of Bret Harte's "Heathen Chinee." In general, since to secure conviction it is necessary to seize the short lobsters while in possession of the offender, the illegal lobsters are kept where they can readily be thrown overboard in case a deputy appears. Our deputies have compelled the fishermen thus to throw overboard at least one million "shorts" this year. In case a deputy does not appear, the "shorts" are placed in a sunken bag or car, the location of which is marked by a buoy kept just under water, or by an inconspicuous floating object which would attract no special attention, such as a bit of wood, kelp, etc., or the bag or car may be hung by a small line over the stern of a boat, or to a boat-mooring, or pile under a wharf. When 50 to 500 "shorts" have been accumulated, these are taken in the night by regular collectors who ply along the shore from Rockport to Plymouth. Some such have been driven so hard by our deputies as to go out of the business, but "there are others." They have a well-organized system of sentinels and spies, who keep track of and

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report the movements of the deputies. The fines imposed by the judges, even at the maximum, are small when compared with the profits; and usually this amount is reckoned as a contingent expense of the business, and is divided among those participating in the profits. Most of these lobsters are marketed as "lobster meat." The following report from Deputy Burney indicates how the law is evaded during the summer at many places along the shores between Boston and Gloucester: —

LYNN, MASS., Aug. 1, 1905.

Commissioners on Fisheries and Game.

GENTLEMEN: — Complying with your request, I make this report of my observations upon the short-lobster traffic on the shores of Massachusetts. The enforcement of the lobster law is becoming more difficult each year, on account of the methods adopted to evade it by the lobster fishermen on the north shore.

In the past it was the custom of the fishermen to *land* their catch; then it was a comparatively easy matter to catch the violators. At present, landing the catch is dangerous, and in some cases a very costly way to dispose of their lobsters. The fishermen have adopted ways of avoiding that. It was soon found that there was a growing demand from the beach houses and hotels along the shore for lobster meat out of the shell. Raw meat soon became too dangerous to handle, and other means had to be found. The new way is an evasion of the law, and it is relatively safe. There are two ways to work it: one is to cut up the raw meat into small cubes, when it is impossible to show to the courts that it is lobster tails; the other is to scald the lobsters on board the boats, cut the meat up, and land it in pails and firkins.

There has been but one conviction (in my recollection) on scalded meat, and that was on meat *not* cut up.

One or two instances are sufficient for examples of what happens nearly every day during the summer season. On Wednesday, July 19, I was at Salem Willows. Two boats ran in on the Beverly side and anchored a short distance off shore. I could see very plainly with my glass every move of the men. They were busy for more than a half hour, shocking out and cutting up lobster meat and putting it into firkins. When they had finished, the meat was taken by one of them to the restaurants at the Willows. They were not gone over ten minutes when another boat came from the Beverly shore and did the same thing.

Tuesday, the 25th of July, off the Magnolia shore, I saw two sloops at anchor, their crews busy "shocking" and cutting up meat. This is something that can be seen almost if not every day. In past seasons it was common talk that a man could run down to the nearest beach any morning early and get a mess of shorts. I am asked quite often, "Where are all the shorts? I used to get a mess once in a while, but I can't get them now." I venture to say that where there were hundreds of short lobsters landed every day five years ago, there is not one dozen landed today. Of course there are some men who *will* take chances, but they are few. Where a man can sell his shorts off shore to the boats en-

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gaged in buying shorts, he will not bring them ashore and take chances. A number of lobster fishermen with whom I have talked say that this is the poorest season they have ever had.

Yours respectfully, THOMAS L. BURNEY.

On the south shore of Massachusetts some "shorts" are handled locally, but the greater number are shipped to Rhode Island and New York, being landed at Newport. Every boat and every stranger is carefully scrutinized, to learn if he is "all right;" and at the slightest suspicion the signal is passed to "stand by to heave the 'shorts' overboard."

The public is largely to be blamed for this condition of affairs. The seashore public creates the demand. It is a common practice to leave baskets outside the doors, where in the early morning short lobsters "descend like manna from heaven," at the rate of 50 cents to $1 per dozen, according to risk of detection. People who carry on such practices might not steal private property, but they thus steal public property. A finer public sentiment should develop. To the unthinking, the attitude of the State appears to be directed solely against the poor fishermen, in a rather petty way. On the contrary, the State is doing its duty in protecting public property and the interests of the fishermen. Too often the fisherman discounts the future by excessive greed in destroying fish, for fish means money.

The public, however, should be particularly warned, and in no uncertain terms, against the use of "lobster meat," *i.e.*, lobster meat which is taken from the shell at a distance from the place where it is consumed. The State Board of Health and the local health boards in every town and city are distinctly and earnestly urged to deal with this lobster meat problem. The facts are as follows: —

Lobster-meat Problem. — Ever since the law prohibiting the killing and possession of short lobsters has been in effect, the fishermen and consumers of lobsters have devised all sorts of expedients to use short lobsters in violation of the law, and to escape detection by the officers. A most common scheme (described on p. 185) is to boil the lobsters on board the boat, remove the meat from the shell, cut up the meat in such a way as to destroy all evidence possible as to the size of the lobster, and bring the meat ashore. This meat is then sold by the pound to private

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customers, to hotel and to restaurant keepers and to near-by city, town and shore resorts. This practice is not alone a screen for the "short-lobster trade," but it is a positive and serious menace to the public health. Numerous severe and even fatal cases of ptomaine poisoning can be traced directly to the use of the lobster meat prepared in this manner; *e.g.*, one day's record is given below: —

Hull, September 1: Francis H. Cleverly of the Hull board of health went over to Fort Andrews at Peddocks Island this morning, and obtained for the first time from Dr. Luke B. Peck, the post surgeon, who attended Antonio Gomes, Joseph Oliver and Joseph Oliver, Jr., who died on the island Sunday morning, a doctor's certificate.

In the doctor's certificate Dr. Peck states that to his best knowledge and belief the cause of the death of all three was ptomaine poisoning, from eating lobster that was supposed to have been decomposed.

The board of health will accept the cause of the death of all three as attributed by Dr. Peck as final, there having been no autopsy. (Boston "Globe," September 2.)

Lynn, September 1: After attending a banquet at which lobster salad was served, several of the great chiefs of the Improved Order of Red Men, who were guests of Winnipurkitt tribe in this city last night and to-day, were taken ill, and in many cases had to call in physicians.

The one who suffered the most from what the physicians call lobster poisoning is Frederick Williams, 84 Tracy Avenue; the others who were compelled to call in physicians are William Embree, George Eastman, Roscoe Patton, Jacob Steadman, E. L. Hiller and W. J. Spoonley. These are all members of the Lynn tribe, and it is not known how many of the visiting great sachems have been affected.

Williams and Spoonley were taken ill while attending the outing tendered to the visitors to-day at Nahant, and forced to leave for home long before the rest of the party. On arriving home they went immediately to bed and called in their physicians. The others who did not attend the outing were taken ill about the same time. Others of the party were affected, but in a less degree.

It is said by the caterers that none but the best lobsters were used in the salad, and that they cannot imagine why any serious effects should be felt. The lobster was bought for fresh, and it was not canned, as was alleged by many of the members of the party; in fact, much of it was bought at the fish market of one of the members of the committee. The other edibles were also fresh, nothing being used that had ever been canned. (Boston "Globe," September 2.)

These facts should be known to the public, and specific warning given as to the danger to health and even to life of such methods of placing lobsters on the market. Every responsible hotel or restaurant manager should refuse to buy lobsters unless

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either in the shell or canned, and customers should object to being served with lobsters at such hotels or restaurants as do not conform to practices which safeguard the life or health of patrons. It is a well-known fact that crab and lobster meat spoils very quickly after exposure to the air. The reason is that the texture of the meat is very loose and spongy, with many spaces through which the air penetrates. This air carries the bacteria which cause putrefaction and the rapid development of certain ptomaines which are virulent poisons even in very small quantities. The bacterial changes which give rise to ptomaines progress most rapidly at about the temperature of ordinary ice chests; *e.g.*, at about 50° F. Ptomaines may develop without the presence of an offensive odor. In the case of the properly boiled lobster, kept in the shell until ready to serve, these changes do not begin so quickly or progress so rapidly, for the reason that adequate boiling sterilizes the shell and the meat, and the sterilized shell protects to a considerable measure the meat enclosed within it so long as the shell is unbroken. Upon removal of the shell the air has readier access to the meat, and ptomaine formation or putrefaction soon ensues; therefore, the shell should not be removed until close to the time for serving the meat. In the case of lobster meat removed from the shell at some distance from the point of consumption, the length of time between the removal from the shell and the appearance of the meat upon the table is in many instances too long for safety. Further, lobsters boiled and prepared under such unfavorable, not to say unclean, conditions are not only often imperfectly sterilized, but also liable to infection from unsanitary surroundings and careless handling, and therefore much more liable to rapidly develop ptomaines. Unclean handling, filthy receptacles, etc., may also introduce the germs of typhoid and other serious infectious diseases. Our deputies are using every effort to make this practice of using illegal lobsters unprofitable, and special attention will be directed to cases where lobsters are sold as meat. But the most effective remedy is a public knowledge of the dangers of ptomaine poisoning from the use of "lobster meat" or "picked meat," taken from the shell in places unknown, and at any considerable period of time before being prepared for the table. Purchasers should therefore be warned

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against buying lobster meat unless it is in the shell or canned; and, in buying lobster, never buy one which was boiled after death.

Many of the lobsters which die in transit, together with the "sleepy" (*i.e.*, moribund) and the "Joe" (*i.e.*, crushed or otherwise mutilated) lobsters, reach the consumer as "picked meat." Such should be bought very cautiously, for the reason that the history of the preparation of it is unknown. "Hash" is said to be above suspicion only "when you know the lady as made it;" but in the case of "picked meat" and "lobster meat" you should in addition know the condition of the lobster and the sanitary conditions under which the meat was prepared, together with the length of time since this preparation.

The sale of lobster meat, therefore, is a serious menace to the lobster supply; it is a burden upon the law-abiding lobstermen and lobster dealers; and, above all, it is a positive menace to public health. The public should demand that lobsters be sold only in the shell or canned. It would be for the great advantage of the public if the present Legislature should pass a law similar to that now in force in Maine, which is as follows: —

All lobsters or parts of lobsters sold for use in this state or for export therefrom must be sold and delivered in the shell, under a penalty of twenty dollars for each offence; and whoever ships, buys, sells, gives away or exposes for sale lobster meat after the same shall have been taken from the shell, shall be liable to a penalty of one dollar for each pound of meat so bought, sold, exposed for sale, given away or shipped. Any person or corporation in the business of a common carrier of merchandise who shall knowingly carry or transport from place to place lobster meat after the same shall have been taken from the shell, shall be liable to a penalty of fifty dollars upon each conviction thereof. All lobster meat so illegally bought, shipped, sold, given away, exposed for sale or transported shall be liable to seizure, and may be confiscated. Nothing contained herein shall be held to prohibit the sale of lobsters that have been legally canned.

While the greatly increased demand without an adequately increased source of supply, involving, as it does, more carefully devised methods of increasing the catch and of utilizing every possible source of supply, — *e.g.*, the legal killing of large lobsters and the illegal killing of short lobsters, and evasion of the law through the practice of preparing and selling illegal sized lobster as "meat," — is responsible to a considerable de-

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gree for the decline of the lobster supply, the most important factor has been generally overlooked, — the *present laws.*

Effect of the Present Laws. — These laws have been in force since 1873, supplemented by a close season in Canadian waters, by the prohibition of canning in Maine, by the prohibition of the killing of egg lobsters in all the States, and strengthened by the efforts of the States and national authorities to secure the purchase of the eggs upon the egg-bearing lobsters taken in the traps, thereby making such lobster legally salable to the agents of the State and the United States Bureau of Fisheries. For the initiation of this practice of purchasing egg-bearing lobsters from the fishermen at a price above that of the market, due credit should be given to the United States Bureau of Fisheries. This practice has resulted in the hatching of millions of eggs which otherwise would have been scraped off and destroyed.

In spite of arrests, imprisonment and fines in all the States and Maritime Provinces for violating the lobster laws, the decline in the lobster supply has continued, and is no longer disputed by those best capable of formulating an unbiased opinion. Upon examining the lobster laws of all the States and of the Maritime Provinces, it was noticed that one glaring biological error is prominently common to all, viz.: *in every case the efforts are directed to protecting the immature, under the fallacious assumption that the fundamental source of the lobster supply is the young lobster, which by growth will become of legal size for market; whereas, in point of biological fact, the fundamental source of supply* is not the young lobster, which in and of itself alone is to furnish the market supply, but the search must be carried back one more step. *It is the egg which is the ultimate source; and the future supply of young lobsters which by growth may be expected to furnish the marketable supply is at the basis dependent upon the number of eggs produced.* Thus, by instituting a law that only those *above* a certain size shall be killed, we have committed a blunder similar to that which would be patent to every one if by practically uniform legislation it should be decreed that only poultry should be marketable which had reached the breeding age, and that every effort should be made to place every bird of

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breeding age upon the market within the shortest possible interval after reaching maturity.

To make this plain, it is necessary to bear in mind certain important facts in the life history of the lobster. For most of these facts the public is indebted to scientists connected with the United States Bureau of Fisheries and the Rhode Island Commission on Inland Fisheries, notably professors F. H. Herrick, H. C. Bumpus and A. D. Mead, and the students working under their immediate direction.

(1) The lobster grows rather slowly, and it is at least four or five years old before reproduction begins.

(2) The natural rate of reproduction is slow. One litter of eggs is produced, under favorable conditions, according to Herrick, every two years, instead of annually; there is, however, a possibility that the large lobsters, say 12 inches or over, which do not moult so frequently as the smaller sizes, may produce a litter of eggs every year.

(3) The growth is not gradual, as, for example, in the case of chickens. On the contrary, only at the time of shedding does a very marked increase in size become evident. By actual observations and measurements, Herrick found that the average increase is 15.6 per cent.; *i.e.*, a 6-inch lobster upon moulting becomes a hard-shelled 7-inch lobster within a month, and similarly a 9-inch lobster may become a 10½-inch, and a 10½-inch may become a 12-inch lobster.

(4) The area inhabited by the lobster is a restricted one. They are not migrants in the sense that mackerel and bluefish are. The only migration is from deeper to shallow water during the period when the eggs are hatching, — June and July. Under modern methods of capture the lobster is pursued by its chief enemy, man, throughout the year, though most actively and by the greatest number of fishermen during the summer months.

(5) The eggs are not laid and abandoned, but are carried outside of the body, attached to the swimming feet under the abdomen, for ten to eleven months, which is the time required for the development of the young in the egg.

On both biological and practical grounds the present laws intended to govern the lobster industry cannot be arraigned too

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strongly. In addition to including the biological fallacy that the breeding animals alone should be killed, it is a law which is well-nigh impossible to enforce. A. C. Bertram, Esq., inspector of fisheries for Cape Breton, has well said, "It would require an officer in each boat to prevent illegal work." Some of the devices by which the law can be evaded have been referred to above (p. 184). Not less than 2,000,000 illegal lobsters have been annually killed in this State in the past three years; in Maine, not less than 15,000,000 per annum; in the Maritime Provinces, including Newfoundland, practically every lobster caught, large and small, is retained. The officials seek to save only the egg-bearing lobsters. The coast line is so extensive and the lobsters so numerous that little attention can be devoted to the detection of illegal practices. The lobster fisheries of Canada are now practically what the Massachusetts, Rhode Island and Connecticut lobster fisheries were fifty years ago; but now a positive decline is seen to be impending, even there, and evidences of the increasing scarcity of lobsters are beginning to appear. This decline shows the same features in Canadian waters as in Massachusetts waters, viz.: —

(1) Decreased average size.

(2) Diminished catch per trap.

(3) The practical disappearance of lobsters from regions where they were formerly plentiful. Just as in the New England States lobsters first disappeared from the regions nearest the markets, so the decline is most marked near the settlements.

(4) A decreased number of egg-bearing lobsters.

(5) An increasing price.

Our Canadian brethren appear to have been the first to be impressed with the necessity of protecting the adult lobsters, for the purpose of securing a natural method of hatching. It is true that the United States Bureau of Fisheries has for many years bought the egg-bearing lobsters, but the chief claim has been that by so doing they were able to hatch millions of eggs which otherwise would have been scraped off by the fishermen for the purpose of marketing the mother lobster. The claim is not seriously put forward that the artificial hatching of lobster eggs is preferable to the natural method.

The closest approximation to the natural methods is that now

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in operation on the east coast of Cape Breton Island, not far from Louisburg. The general plan was well stated by R. N. Venning, Esq., at the convention in Boston, in 1903, as follows: —

In connection with efforts to maintain the supply of lobsters by methods of artificial propagation and protection of the breeding fish, an interesting experiment was this year [1903] initiated at Fourchu, Cape Breton County, N. S., under the auspices of the Department of Marine and Fisheries. An arrangement was made with Mr. H. E. Baker of Gabarouse, a large operator in the canned and live lobster trade in Cape Breton Island, for the utilization of his lobster pounds at Fourchu, which were partitioned off for the reception of lobsters of different classes and in different stages. (See illustration opposite.)

The principle of the scheme was to purchase from the fishermen 50,000 desirable seed lobsters, and place them in a suitable pound for protection, where they could be retained and fed during such time as fishing operations were proceeding; after which, or when the eggs were sufficiently advanced, the lobsters were to be liberated along the coast whence they were taken, thus permitting such of them as had not already cast their fry in the pounds to hatch their eggs in their natural haunts, in conformity with the strict methods of nature.

A specialist of the department was sent to inspect the working of the scheme, and on the 5th of August he reported that the eggs were hatching out in millions within the enclosures of the pounds, and the young lobsters were making their way through the wire netting into the sea. At the time of his visit there were still in the pounds about 20,000 berried lobsters, the eggs of which were in various stages of development, while the enclosure was teeming with vigorous, newly hatched fry.

It is perhaps not too sanguine a conclusion to say that, so far as can be proved by the facts actually observed in the experience of those charged with the conduct of this experiment, its result was a complete success. At all events, these 49,769 mothers, with their progeny, were at least saved out of the actual catch of the fishermen, and would otherwise have found their way to the markets, either as canned goods or exported alive, after the eggs had been raked off.

In October, 1905, the chairman and Commissioner Delano had the privilege of inspecting this pound, under the guidance of Messrs. A. C. Bertram, inspector of fisheries for Cape Breton, H. E. Baker, owner of the pound, and the Hon. Alexander Johnston, M.P. The method of construction is shown in the illustration. The area is approximately one acre. The location is admirably chosen, both on account of being a natural resort of lobsters during the hatching season, and also because the currents are such that the just-hatched and helpless lobsterlings are scattered over a wide area in all directions by the gentle currents.

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The results can scarcely fail to be of future benefit in assisting to check the decline, as well as of present benefit to the lobster fishermen by providing a ready legal market for egg-bearing lobsters, thus reducing the temptation to scrape off the eggs for the purpose of evading the law. Mr. Bertram, at the convention, in 1903, supplementary to the statement of Mr. Venning, quoted above, said: —

What we all desire to do, it appears to me, is to consider the question of keeping up the supply. I may say that in the early '80s we began by hatching out lobsters by artificial means, with what we called an incubator. I think that this system of hatching lobsters was originated in Newfoundland by a Mr. Neilson. The first incubator was a wooden box, with a perforated, metal bottom, about 3½ feet in length, made like a cradle, which he anchored in the bays and harbors; the motion of the water would keep it rocking, and this hatched the lobster fry, which would escape through the perforations of the car. There were no beneficial results from this system, and we soon abandoned it. Last year a pound was created on Cape Breton Island, costing about $5,000.

The greatest drawback that we have discovered for keeping up the supply was that the fishermen cared not what happened to-morrow, so long as they were provided for to-day. It would require an officer in each boat to prevent illegal work, and it was very hard to detect them when the spawn had been rubbed off each egg-bearing lobster.

With this pound system we buy up the egg lobsters from the fishermen; such lobsters are put in cars by the packers, and a boat goes around the coast and takes up the lobsters that are in the cars and carries them to the pound. We leave them there until the close season begins, then we liberate the lobsters from the pounds; therefore, those fish would have time to spawn. Then, when the close season begins in another section we take the egg-bearing lobsters out of the pound and liberate them along other sections of the coast, and then they spawn annually.

I believe that this is the right system. I am thoroughly convinced that our government is warranted in any reasonable expense for this. Ten thousand dollars for this was appropriated this year.

The following extract, from Professor Prince's report on "Fish Breeding," is of importance in this connection: —

The lobster pounds operated by Mr. H. E. Baker of Gabarouse, Cape Breton, under the department's auspices, were again very successful. The lobsters, according to the contract, were collected from the fishermen by Mr. Baker in his business as a lobster packer, excepting that he employs extra tug assistance and sailing smacks and special hands, and selects fine seed lobsters, — that is, female lobsters bearing eggs. These were carefully carried, not to the cannery, but to the reserve

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tidal pounds at Fourchu, Cape Breton, and after the commencement of the close season were replaced in the open sea, so that they might incubate and hatch out their eggs under natural conditions. On July 22, the first batch of seed lobsters were liberated, to the number of 24,800; and between July 30 and August 13, 31,820 more lobsters were set free in the sea, being scattered over the known breeding resorts of these valuable crustaceans. During their confinement in the pounds the lobsters were fed with herring and other food. Some mortality is of course unavoidable; but this was last year kept very low, but was slightly higher this year, as the report of the officer in charge on behalf of the department shows. Mr. H. C. V. LeVatte stated the mortality as follows: —

	1903 (Per Cent.).	1904 (Per Cent.).
May,	2¼	2½
June,	3⅛	3¾
July,	4	5¾

The increased mortality in July this year was due to the extreme heat of the sun, and the only remedy was the removal of the lobsters, which were placed in crates and conveyed to deeper cooler water, where the death rate at once decreased and the sickly lobsters recovered. "The natural propagation of lobsters," says Mr. LeVatte in his report, sent to me on December 31, "will no doubt materially increase the supply on this coast, and I consider Mr. Baker's scheme has proved a success." Of course the system adopted at Fourchu is a somewhat complicated one, and can only be satisfactorily adopted where the skill and experience of trustworthy parties can be secured. Mr. Baker is a lobster packer of long and unusual experience, and in his hands a scheme involving the handling, transference in crates, planting in the tidal enclosures, feeding and care and final retransplanting in the sea again, can be carried out with a greater measure of success than in most localities. The department also authorized one of its officers to supervise the work, and furnish proper reports of the progress of the operations of impounding and of replanting in the ocean. The system is so open to abuse that in many localities it could not possibly succeed so well as it does on the Cape Breton coast.

While this method comes nearest of anything thus far attained to the prime necessary condition, viz., the utmost possible protection to the adult lobster, it is open to the following objections: —

(1) The escape of millions of young, just-hatched lobsterlings from the interstices of the pound cannot fail to attract

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fishes, which devour enormous quantities. This is a most serious objection, when it is borne in mind that under natural conditions but a few eggs hatch at a time, and, as the mother lobster crawls along the ocean bottom, the young escape in such small numbers as to be of slight evidence to predaceous fish. If no trail is left, comparatively few fish are attracted, and relatively few young are thereby destroyed. If it proved expedient to develop this method, smaller and scattered pounds, favorably located, will, in our opinion, yield better results than a single large pound.

(2) The second objection lies in the fact that the fishermen are paid at the expense of the public for doing what is obviously for their own interest.

(3) The plan does not extend far enough. Not a sufficient number of individuals are protected, and these only of one sex. (*a*) It is of equal importance to preserve the males which are of breeding age, for nature has established the proportion of male to female lobsters, necessary to insure fertilization of the eggs, at approximately equal numbers. Herrick puts it at 100 males to every 106 females, and the observations of the writer confirm this. (*b*) Not *all* the females of breeding age are included. Our observations indicate that not over 20 per cent. of the mature females are thereby protected. *If it is an advantage to protect some of the female lobsters, it must be of greater advantage to protect all of them.* The method pursued by the Bureau of Fisheries for many years, and two years ago adopted in Massachusetts, of buying the egg-bearing lobsters and hatching the eggs artificially, is open to all of the above objections, and to the more serious one that artificial hatching, if followed by the liberation of the just-hatched fry, appears to the writer to be far inferior to the natural methods. The chief value which can be claimed for this method is that many lobsters are carried off shore and liberated, where the eggs hatch under natural conditions.

The method devised by Dr. H. C. Bumpus and elaborated by Dr. A. D. Mead and his assistants is a distinct advance, for the reason that it aims to rear the lobsterlings past the age when they float helpless at the surface of the water, a prey to surface-feeding fish. This method should prove of great value in eluci-

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dating in a scientific manner the natural history of the lobster. Its limitations are found in the commercial impracticability of operating on a sufficiently large scale at a satisfactory cost.

The problem which must be solved is nothing less than the checking of the decline of the lobster supply, and restoring the lobster to the position which it formerly held, as wholesome and delicious food for the people at large, rather than to permit it to become merely a delicacy to grace the banquet table. The methods now available must be through legislative action, affording practical assistance to nature in increasing the efficiency of natural methods. *Legislative action must be either in the direction which promises to lead to increasing the egg production of the race, or to the control of the lobster's enemies, of which man is the chief.* Action on both these lines would promise most satisfactory results. Such laws, to be effective, must be judged by the probability: (1) of their leading to an increase in the supply of lobsters without limiting the present demand; (2) of appealing to the common sense of the people, as likely to secure the results aimed at; (3) of rapid, efficient, equitable and inexpensive enforcement; (4) of working the least possible injury to important vested interests, both of fishermen and dealers; (5) of furnishing the most satisfactory market conditions with reference to the public demand in regard to size, season, price, etc.

Legislative Action which seeks to increase the Reproductive Capacity of the Lobster must protect the Adult. — Attention has been called above (p. 190) to the fact that the actual source of maintenance of the supply of legal and marketable lobsters is only *indirectly* those lobsters which are just below the legal length (and which, if spared, would become of legal length in a brief time). The direct and fundamental source is the eggs, from which come the small lobsters; and therefore the number of future marketable lobsters depends directly upon the number of eggs laid. Herrick has shown that the egg-producing capacity practically doubles three times in the growth from 8 to 14 inches, being for an 8-inch lobster an average of 5,000 eggs; 10-inch, 10,000; 12-inch, 20,000; 14-inch, 40,000. "A 17-inch lobster produces about 63,000 eggs," on an average. "The largest number recorded was 97,440 eggs. In one case

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the lobster was 15 inches long, and in another 16 inches long." This proves that the more valuable lobsters for egg-production are those above 10½ inches long, and that the number of eggs produced is very greatly influenced by the number of breeders above 10½ inches. Herrick found that "female lobsters become sexually mature when from 8 to 12 inches long. The majority of all 10½-inch female lobsters are mature. In 100 dissections 25 females were found, from 9 5/16 to 12 inches long, which had never laid eggs; but in 8 of them the ovaries were nearly ripe. Of the 17 immature, 6 were 10½ inches or over in length, and in most cases the ovaries would not have become mature for two years." Of the 2,602 egg-bearing lobsters collected by the "Egret" during the season of 1905, from May 1 to December 1, only 129 measured less than 10½ inches; 161 measured exactly 10½ inches, 25 measured 10¼ inches, 63 measured 10 inches, 16 measured 9¾ inches, 16 measured 9½ inches, 3 measured 9¼ inches and 6 measured 9 inches.

From the data which the writer has secured by personal observation from Rhode Island to Newfoundland, there are in the ocean, for every lobster 10½ inches and over, from 3 to 6 lobsters 9 to 10½ inches. The number varies in different localities. The aggregate weight of the average 100 lobsters 10½ inches and over, as they come to the Boston market, varies between 160 and 170 pounds.[1]

The aggregate weight of 100 lobsters from 9 to 10½ inches is about 105 pounds (weights taken from individuals actually weighed and measured). I found that it required 155 9-inch lobsters to weigh as much as 100 of the average size in the Boston market. One hundred and fifty-five 9-inch lobsters can be expected to lay 190,000 eggs within a year, assuming that one-half of the number are females, and that one-half of these have reached the period of egg-laying and average 5,000 eggs

[1] One thousand and ten lobsters from entire original packages, chosen to fairly represent a typical shipment from Nova Scotia, comprised 563 11 inches or less, or 56.3 per cent., and 437 over 11 inches, or 43.7 per cent.; of these latter, 262 were between 11 and 12 inches, 151 were between 12 and 13 inches, 25 were between 13 and 14 inches and 9 were 14 inches. The largest was 14¾ inches, the smallest was 10 inches; of the 1,000, 35 were below the legal limit of 10½ inches. These were selected from probably upwards of 6,000 lobsters. Of the remaining 5,000, many of those above 9 inches were shipped to Rhode Island and New York; the balance were canned, or consumed in Nova Scotia.

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each; 100 lobsters above 10½ inches similarly can be expected to lay 1,000,000 eggs within a year, assuming that 50 of them are females, and each of these yields 20,000 eggs.

While, commercially, the larger size (10½-inch) is worth 55 per cent. more than the smaller one (9-inch), biologically, *i.e.*, in its egg-laying capacity, the larger size is more than 500 per cent. more valuable for increasing the lobster supply.

All this goes to prove that the lobsters above 10½ inches are most valuable for egg producers, and that to increase the reproductive capacity of the race the larger lobsters (i.e., above 10½ inches) must be protected by law. What sane breeder, working for the improvement of a race of domesticated animals, would kill as many as possible of the best breeders, and depend upon the progeny of the youngest stock to improve or even maintain the standard? Yet such is the effect of the present lobster law.

Legislation should adequately protect the Lobster from its Enemies. — The other main point is the method of securing adequate protection from enemies. The former wonderful abundance of the lobster on our shores proves that, so far as natural enemies are concerned, the lobster is not only well able to maintain itself, but probably also to increase in numbers. It appears to be its own worst natural enemy, as its cannibalistic proclivities are notorious, though probably not operative to a very large extent except when confined in too restricted quarters. So long as the ordinary number of individuals (mainly immature) were killed by their natural enemies, such as dogfish and other sharks, cod, bass, etc., no disastrous consequences were evident. But how disastrous and alarming have been the results of the onslaught by man, chiefly upon the mature individuals, under the direction of the present laws, which have no common-sense foundation, and no parallel or precedent in dealing with animals of similar habits, as an excuse for remaining on the statutes!

The present law, fixing the legal size at 10½ inches, had its origin in a complete misconception, due to a lack of biological experience. It was argued that if lobsters as small as 8 inches were taken, many lobsters would be killed without having had a chance to reproduce a single litter of eggs; whereas, if none were killed less than 10½ inches long, the majority would have

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laid at least one litter of eggs. Since 1873, when this law originated, our biological experience has widened. Thinking people now wonder that the error could have been committed of expecting beneficial results from any law the tendency of which is to reduce the reproductive capacity of the animal, first, through the destruction of those adults which laid the most eggs, and, second, by a tendency to limit the breeding to immature animals. The law was copied by successive States, until laws practically identical in the primary features are in force throughout the lobster-producing States.

A further severe arraignment of the present law is its inherent difficulty of enforcement. This difficulty is not peculiar to conditions in Massachusetts, — it is the same from New York to Newfoundland (compare p. 192).

There appear but two worse laws than that of Massachusetts, and the difference is only one of degree, not of kind. Two States permit the capture and sale of 9-inch lobsters, and in some sections of the Maritime Provinces 8 inches is the legal length. Under the leadership of those who for their own selfish gain would strive to annihilate the last lobster, the attempt is made annually, under various covert pretexts, to foist upon the depleted industry a straight 9-inch law, thus for a brief present gain increasing the burden under which the industry is gradually sinking. To offset such efforts, however, earnest and honest good sense has thus far successfully prevailed. There is expressed on every side a sincere desire to ascertain the proper method of checking the depletion of the lobster supply, and immediately applying the remedy.

A Close Season, — Advantages and Objections. — Of the various propositions, the one most seriously considered is that of a close season, either for a term of years or for a portion of each year. A close season for a term of years would be of great advantage to the lobsters, and without question would bring about an increase in the number of lobsters in the ocean; but, as has been indicated above, the period, to be of any value commensurate with the loss which would be entailed to vested interests, must be for at least five years; and even then, if the present laws permitting the killing of adults should again go into force, the results of the five years' close season may dis-

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appear in a single season of fishing. Unless the close season extending through a term of years is supplemented by a law which removes the cause of the depletion, the lobster supply is merely made intermittent, instead of perennial and perpetual. There must follow a consequent demoralization of the market, and an economic waste. In the opinion of those who have given the problem the most study, the lobster fisheries can by proper measures be made an abundant and permanent source of wealth to the fishermen and dealers, and a continuously available delicacy for man for an indefinite period of time.

A close season for a portion of the year is usually the first resort. It is based upon the argument that, inasmuch as a decline is caused by the killing of too many individuals, a close season must tend to restrict the number killed; and if the killing is entirely prohibited during the breeding season, the number of young which may be produced is likely to be increased. A close season may bring very manifest and satisfactory results in cases when the animal is a rapid breeder, or where the young reach maturity in a short time, say within one year, as birds. But it is by no means safe to argue that therefore a close season is equally applicable for checking the numerical decline of every or any particular animal. This is notably true of the lobster. A close season must fail to bring the expected results, for the reason that the lobster is a slow breeder, ordinarily laying eggs but once in two years, and carrying these eggs, attached to the modified legs under the abdomen, for ten or eleven months after laying; while the young require probably from four to seven years to reach maturity, and to attain a length of 7 to 10 inches.

Since the lobster breeds but once in *two* years, and carries the eggs from ten to eleven months after laying, it manifestly can make no difference to the race whether the young are destroyed as unlaid eggs, as eggs recently laid, or as eggs just on the eve of hatching. The chief value of the close season to the lobster is that fewer lobsters may be caught; but the lobstermen and the public bear the burden, while the lobster does not get a commensurate benefit.

Even in Massachusetts there may be practical difficulties in deciding upon a date for beginning and ending the close sea-

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son, on account of the various opinions as to how long such a close season should be, and from the fact that the lobster catching begins south of Cape Cod earlier in the spring than it does on the north shore. This ground for discord increases somewhat if the regions for which uniform laws are necessary are as far separated as New York and Newfoundland.

A further defect of a close season during a portion of the year is the fact that the lobster is especially convenient and satisfactory for human food during the warm season, which is the period of hatching (May 15 to July 25) and the period of egg laying (August to October).

Finally, the fundamental defect of a close-season law is that it restricts the demand, but does not adequately and economically increase the supply. The aim of sound economic legislation should be to increase the supply, without limiting the demand. In general, laws prescribing close seasons, restrictions in times and methods of catching, prohibition of canning or otherwise limiting the demand, should be the last resort, and then only after it has been found that efforts to increase the supply are futile.

Aside from the practical difficulties of securing a close season throughout the lobster range, and enforcing the laws, the value of the close season to the lobster as a race is commensurate with the duration of this close season. The longer it extends, the better for the lobster, but the worse for man. The burden upon investments in the lobster fisheries is increased. The absence of the lobster from the human food supply is felt by the public. Yet all this is of little avail, for the effects of the close season are not permanent, — the causes of the decline have not been removed. The lobsters, through a close season, either from one to six months each year or for a continued series of years, may have a chance to "catch up," only to be themselves "caught up" with redoubled energy, resulting in a glutted market and consequent economic waste for a time, with the certainty of a rapid return to the former conditions which made a close season necessary.

The grave objection to the present laws, namely, the practical difficulties in the way of enforcement, is also present in the case of a close season for catching, unless the law carries with it the prohibition of possession or sale during that close season both

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for lobsters caught in Massachusetts and in other waters. The utter impracticability of securing close seasons for a uniform period from New York to Newfoundland, is a further objection to be considered.

Results under the Present 10½-Inch Law. — The 10½-inch law was fixed at this definite point in the belief that, by the time the lobster reached 10½ inches, practically all the individuals had laid at least one litter of eggs; and it was fixed at the 10½-inch point in the hope and expectation that, on account of the seemingly inexhaustible numbers, one litter of eggs would be sufficient to maintain a supply. Later experience has brought into relief the fact that nature has secured the continuance of the lobster supply by fixing the number of eggs at not far from 500,000 to each pair of lobsters. It was a serious biological error to believe that a reproductive capacity of 5,000 or 10,000 eggs could be expected to furnish as many lobsters as there would be if lobsters were permitted to produce the full number of eggs which nature demands for maintaining the species, viz., 500,000. *Therefore, it is obvious that the lobster must be given greater opportunity to breed,* and as many adult individuals must be saved as possible, in order that the supply may not become commercially extinct. *In other words, we must furnish the lobster additional length of time for breeding, so that the adults, instead of being exposed to capture as soon as they have produced say 15,000 eggs, should be protected for the purpose of enabling them to produce the full life quota of approximately 500,000 eggs.* Under the present laws we put a premium upon the catching of the adults of breeding age, whereas some law should be devised which will protect these adults.

Under the present laws, the number of adult breeding females has steadily and rapidly decreased. Reference to the following figures, compiled from the annual reports, indicates the startling magnitude of this decline: —

Year.	Total Number of Lobsters caught.	Number of Egg-bearing Lobsters caught.	Or One Egg-bearing Lobster to every —
1890, ...	1,612,129	90,909	22.8
1905, ...	426,471	9,865	42.1

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The average female lobster in Massachusetts waters produced in 1905 15,670 eggs, according to the computations made from 1,311 specimens by Supt. C. G. Corliss at the Gloucester hatchery. This indicates a decline of at least 50 per cent. from the natural average yield per individual female.

The other line of action, namely, that of purchasing egg-bearing females from the fishermen and dealers (who, by keeping the lobsters in confinement in pounds, have discovered an additional source of profit from the sale of such lobsters as chance to lay a litter of eggs while in the pound), and either permitting the eggs to hatch while still attached to the swimmerets of the mother, or liberating the egg-bearing mother at the close of the open season for catching, approximates more closely to the correct and necessary method, namely, the protection of the breeders.

Proposed New Law. — In the opinion of the writer, — and the opinion is supported by many competent authorities (see p. 210), — if we would adequately protect all adult lobsters above 10½ inches we could safely permit the legal capture of those between 9 and 10½ inches. Such a measure presents no similarity to the ordinary 9-inch law, *i.e.,* which permits the capture of *all* lobsters above 9 inches; but it combines the advantages of such a 9-inch law with the benefits of a close season law for an extended period, *i.e.,* it permits the catching of lobsters above 9 inches, which are of least value in maintaining the species, and puts a close season upon those above 10½ inches, which lay the greatest number of eggs, and eggs of the best quality for producing the strongest progeny. The ordinary 9-inch law, permitting the catching of everything above 9 inches, would be calamitous to the lobster industry. The public owes a debt of gratitude to the officials and members of the Massachusetts Fish and Game Protective Association, who have actively opposed such a 9-inch law at the public hearings and elsewhere.

The present suggestion, however, is entirely different, since it provides for a close season upon the adult and upon the smallest lobsters, permitting the catching only of those between 9 and 10½ inches. The present chairman of the commission in 1902 made an investigation of the question, at the instance of His Excellency Governor Crane and Captain Collins, then chairman

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of this commission. His report in no way covered the question of the expediency of such a change in the law; he merely called attention to the scientific basis of the law. As the present chairman of the commission, it is his duty to consider in addition the expediency of such legislation, and to call attention to the fact that such legislation is entirely untried, and is a theory, pure and simple. Nevertheless, it is a theory, or, rather, *a biological principle of action, which has been applied with success to whatever animals and plants man has found necessary or possible to domesticate; and has been proved to be an absolutely essential procedure, if we would maintain and increase the supply of such domesticated animals and plants.* It is, therefore, not entirely a new theory, but merely the application of an old theory to a new case. The results of such a law are not susceptible to proof until the evidence can be furnished by the actual observations upon the effects of such a law.

It is important, in a case like the present, to give greater attention to the objections to such a law than to the advantages. These objections appear to be at least five.

First of all, it is not uniform legislation throughout the lobster-producing States, and there is a possibility of working hardship to other States. For example: undoubtedly from Maine there would be a tendency to divert the 9-inch lobsters to the Boston market, and Maine would then be in the same position with reference to Massachusetts and the States south as is today Massachusetts in reference to the 9-inch laws in force in New York and Rhode Island. In addition to that, the States of Maine and the Canadian Provinces would be deprived of their market for large lobsters. This, however, should be an ultimate benefit, as more eggs would be laid, and therefore a larger number of marketable lobsters would develop from these eggs. Should Massachusetts and New York, the States where the most lobsters are marketed, pass the suggested law protecting the adults, and permitting the sale only of those lobsters between 9 and 10½ inches, the other States and Provinces would probably find it to their advantage to follow with similar laws.

Secondly, the law is on its face more difficult to enforce, because two measurements, the 9-inch as the lower limit and the 10½-inch as the upper limit, are necessary. The difficulty

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of dealing with the upper limit can, however, be remedied by the use of a pot with a legal-sized ring (of such inside measurements as would prevent the entrance of lobsters above 10½ inches), and an inspection and registration of the pot, instead of the inspection of the lobsters. Our observations upon the catches made by pots with various-sized rings follow. These figures cover the observations on experimental lobster pots with entrance rings of the sizes indicated, and show that a smaller number of large lobsters are caught in the smaller rings.

Largest Lobsters out of a Total of 325 caught in these Pots.

Inside Diameter of Entrance Ring.	Length (Inches).	Diameter (Inches).	Inside Diameter of Entrance Ring.	Length (Inches).	Diameter (Inches).
3-inch ring, . .	11	2⅜	4½-inch ring, .	12½	3⅛
3½-inch ring, . .	12½	–		12	3
	12	3		12	3
	12	3¼		12	3
4-inch ring, . .	12½	3		12½	2⅞
	12	2⅞		12½	3⅛
	12½	3⅛		12	2⅞
	12	3		12	3⅛
	12	3⅛		13	3½

A 3½-inch ring permitted the entrance of 20 lobsters 10½ inches or over, out of a total catch of 56 lobsters, or 35.7 per cent.

Length (Inches).	Diameter (Inches).	Length (Inches).	Diameter (Inches).	Length (Inches).	Diameter (Inches).
10⅜	–	10⅜	2½	10⅜	2⅜
12½	–	11	2⅞	11½	2⅜
11¼	–	10⅜	2¼	11	2⅞
11¼	–	11	2⅜	11¼	2½
11½	2¼	10⅜	2½	11	2⅜
10⅜	2½	12	3	12	3¼
11	2¼	10⅜	2⅜		

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A 3-inch ring permitted the entrance of but 4 lobsters of 10½ inches or over, out of a total catch of 37 lobsters, or only 10.8 per cent.

Length (Inches).	Diameter (Inches).	Length (Inches).	Diameter (Inches).
11	2⅜	11	2½
11	2½	10½	2⅝

The third objection is the injuries to vested interests, — to capital invested in the lobster business. It is a fact that such a bill, if it became a law, would reduce the average size of marketable lobsters six-tenths of one pound, and more lobsters would have to be handled by the lobster dealers for a given amount of money (in exact figures, 155 lobsters to every 100 lobsters under present conditions). Undoubtedly, too, the price per lobster paid by the dealers to the fishermen would be on the average correspondingly less than at present. On the other hand, the public demand and use a lobster as small as 9 inches, and the use of at least three times as many lobsters as under the present law would, in the opinion of the writer, do less damage to the future supply of lobsters than does the present destruction of lobsters above 10½ inches.

A fourth objection is found in the fact that perhaps in at least two places in Massachusetts the large lobsters predominate in the catch, and therefore the present interests of the fishermen at these places might be injured. But it is not entirely certain that this injury would be actual, and from personal observations we are convinced that there are even at Cape Cod at least six lobsters between 9 and 10½ inches to every one over 10½ inches.

A fifth and most important query is, will enough lobsters escape the critical period of 9 to 10½ inches and pass into the exempt class, where they can be sure of an extended period of egg-producing usefulness? This is entirely problematical, and there is at present absolutely no knowledge bearing upon the case. It is a fair presumption that enough would so escape. In any event, the lobster would have, under the proposed con-

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ditions, — exemption from capture after reaching the point of 10½ inches, — far greater opportunity to lay a larger number of eggs than under existing conditions, since under the present laws not only every lobster above 10½ inches is exposed to capture, but, as a matter of fact, a greater number of those between 9 and 10½ inches or even smaller are captured, in spite of all the machinery of law-enforcement which can be brought forward. The fact that lobsters on the average increase 15.6 per cent. at a moult is of importance. Thus, a 9-inch lobster would become 10½ inches in one moult, and a 9½-inch lobster would become 11 inches, and thus exempt. Many individuals would pass within a few days entirely beyond the legal size for capture; and the actual length of time which a lobster requires to pass through the dangerous period of adult life (*i.e.*, from 9 to 10½ inches, the only period when exposed to legal capture by man) may be, after all, relatively brief for any one lobster. Yet there should be such a number of individuals as to satisfactorily supply the market.

Our experience with the present laws dates from 1873. Since that time, even with the protection of a certain number of adults by purchase of egg-bearing lobsters and the hatching of eggs by the United States Bureau of Fisheries, and in spite of the fact that the 10½-inch limit was fixed at a point where the lobster had an opportunity to produce at least one litter of eggs, there has been a gradual decline in the catch of lobsters in Massachusetts from 84 per pot in 1891 to 26 per pot in 1904. The present laws are difficult to enforce: first, the public demand for 9 to 10½ inch lobsters is strong; second, it is easy to destroy the evidence that a lobster was below the legal limit of size; third, the law is easily evaded (as described on p. 184), and therefore tempting; fourth, it is not practicable to properly safeguard the law-abiding fishermen. Honorable men throw overboard the short lobsters from their traps, and see these caught the next day by unscrupulous neighbors.

In the opinion of this commission, the lobster is approaching commercial extinction. In the neighborhood of the great markets, *i.e.*, in the waters of Connecticut, Rhode Island and Massachusetts, the decrease is especially evident; yet the biological conditions and the productive capacity of the range still re-

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main essentially the same as they did when these same waters produced at least ten times the number of lobsters that they do to-day. Under wise laws, these waters might again produce as many lobsters as they did twenty or more years ago; but, in order to produce again the requisite number of lobsters to meet the demand, not only must there be protection for *all* the adults of breeding age, but active measures must be taken for placing the artificial lobster industry upon a commercial basis, when the value of the number of young lobsters produced will be in dollars and cents greater than the actual cost of production. The trout, shad and oyster industries have reached that stage. The lobster industry at present has not; but the outlook is promising, and appears to lie through the protection of the breeders, supplemented by protection of the just-hatched young up to such a stage as they are able to care for themselves on the bottom of the ocean, either after the methods developed by Bumpus and Mead in Rhode Island, or by the method of specially protected breeding reserves or nurseries for the young; and on this your commission hopes to have something to report next year.

In conclusion, we may say that for the interests of the Commonwealth and of the lobster a new law, restricting catching to those lobsters between 9 and 10½ inches, and putting a close season upon both males and females above 10½ inches, is without doubt a step far in advance. It is not a departure so radical as it appears to the popular mind at first glance. The close-season law has many obvious advantages, and the protection of the adult lobster is already in practical operation to a limited extent. The proposed measure is a combination of the two, and, though essentially a compromise measure, it embodies the advantages of both laws, with the disadvantages of neither.

Finally, such a law as would permit the legal catching and marketing of any lobster between 9 and 10½ inches, except those with eggs attached, would readily meet the market conditions in all the States and the Maritime Provinces. It would permit fishing to be carried on at all seasons, for the close season would then be upon only a *part of the lobsters all the year*, instead of upon *all the lobsters for a part of the year.*

During the past four years this modification of the law has

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been carefully considered, and now numbers among its adherents many persons whose intelligence is unswayed by personal considerations, since they are interested in the lobster neither as fishermen nor dealers, and whose opinion is, therefore, of greatest weight.

The opinions given on the pages which follow have been expressed by prominent scientists, who are active students of marine biological questions: —

The killing of the breeding animals is the most rapid and certain method of reducing the numbers of undesirable animals. This has long been known in the case of land animals.

Prof. E. E. Prince, F.R.S., Commissioner of Fisheries of the Dominion of Canada, thus calls attention to the value of such practice when it is desirable to use the most effective method to diminish the number of fish of little value, *e.g.*, suckers, perch, pike, etc. ("Methods of Coarse Fish Extermination," Sessional Paper No. 22, 1904, p. lxxiv.) If it were actually desired to exterminate the lobster, what more effective method could be used than the present practice of catching the adults?

I have long held the belief that our protection of lobsters was ineffectual, on account of its allowing the large lobsters, upon which we depend for keeping up the stock, to be destroyed. They are the sole source by which the species is to be maintained. In all similar cases we are coming to learn from our studies of fish and game that a large number of eggs and young are produced to maintain the numbers of the species.

The greatest fatality in most species occurs during the period from the egg to maturity. Most biological enemies surround the species in its immature stages. Man often strikes the adults of a species upon which it depends for maintenance, and in that way, before he knows it, has worked extermination.

We should revise our measures of protection distinctly, so as to include the breeding members of the species; and we should take our food-supply fishes and lobsters and practically all game species from the immature stages, before they have arrived at the important breeding stage. For that reason I should advocate the taking of lobsters only under 10½ inches or between the lengths of 9 and 10½ inches, for at least a term of years. (C. F. Hodge.)

The following letter was received from Prof. Sidney I. Smith of Yale: —

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NEW HAVEN, CONN., Jan. 19, 1906.

MY DEAR DR. FIELD: — Your proposition to protect the larger instead of the smaller lobsters appears to me by far the best method yet suggested for the preservation of the fishery on our coast. Between thirty and forty years ago, when lobsters were still abundant, I believe that less than 1 per cent. of the young were produced by individuals under 10½ inches in length, and I presume that this may be true at the present time. Even if the protection of the small individuals was fully enforced, it would, I believe, have comparatively little effect in preserving the supply of young, while the protection of the larger individuals would insure such a supply.

Very truly yours, SIDNEY I. SMITH.

WILLIAMS COLLEGE, WILLIAMSTOWN, MASS., Feb. 6, 1906.

Dr. GEO. W. FIELD, *Chairman, Commission on Fisheries and Game.*

DEAR SIR: — Will you allow me to say that the proposed recommendation to alter the existing lobster laws of the State of Massachusetts seems to me to be very wise, in view of their failures in this State, as well as the failure of the laws of other New England States and those of New York, to prevent a marked decline in the lobster supply.

Concerning new legislation, I do not believe in completely restricting production for a part of a year of for a term of years by a close season. I have argued against it in the case of the soft clam. One New England State has a close season of several months on the soft clam. It has not in any way prevented the falling off of the supply, so far as my observation goes.

As breeding in lobsters is so slow a process, and as the production of eggs increases so enormously with age in the female, I believe that the proposed amendment of the law, to protect lobsters *more* than 10½ inches long, allowing the capture and sale of those less than that length, would be the wisest measure that could be proposed.

Very truly yours, JAMES L. KELLOGG,
Professor of Biology, Williams College.

DARTMOUTH COLLEGE, BIOLOGICAL DEPARTMENT,
HANOVER, N. H., Feb. 8, 1906.

MY DEAR PROFESSOR FIELD: — I have read your report, with its recommendations for changes in the laws controlling the lobster industry, with very great interest.

I believe you have worked out a plan for legislation based on thoroughly sound biological principles. Your plan appears to me *simple* and *practical*, easy to *enforce* by trap inspection and control, very *flexible*, so that, without changing the principles on which it is based, it will be possible, as experience may dictate, to raise or lower the dimensions and age of the protected sizes by regulating trap construction; and, finally, it promises, in my opinion, to effectually check the rapid decline in the number of lobsters without hardship to either the producer or the consumer.

I wish you every success in your efforts.

Yours very truly, WILLIAM PATTEN,
Professor of Zoölogy.

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The following statement is made by Dr. F. H. Herrick, who is the well-known special investigator for the United States Bureau of Fisheries, upon the lobster and the lobster industry: —

In restricting the size of marketable lobsters, the Atlantic coast States have adopted, and tried to enforce, a method which may be accurately described as (1) partial protection of the young and adult, with emphasis on the *young*, the aim being apparently to allow the adult to breed at least once before it is sacrificed. This, however, is not always done, since, as I have demonstrated elsewhere, the period of maturity is commonly delayed until after the 9-inch stage, and may even be deferred until the animal is over 11 inches long. This method, which has been given more than a fair trial, has proved sadly lacking.

We cannot speak of protection for the young alone as a *method* in this sense at all, for to destroy all adults indiscriminately is to wipe out the egg producers, and with them the race.

Protection of the adult alone in a strict sense is not practicable, because, as we have just seen, the period of maturity fluctuates between wide limit (8 to nearly 12 inches), and because the market must be supplied with animals of fair size.

The method which may be described as (2) partial protection of the adult and young, with emphasis on the *adult*, was first proposed by Dr. George W. Field in 1901. He advocated a change of the existing policy of protecting chiefly the young lobster, by placing the weight of restrictive laws upon the adult animal above a certain size, as 10 to 11 inches, when it is becoming most prolific, and therefore most valuable for the fishery. He would protect also the young up to the length of 8 or 9 inches; so that it would be permissible to capture adolescents and adults of all lengths between 8 and 10 inches, or between 9 and 10½ or 11 inches, while at either end would stand a permanently protected class of adults and young. Such a method has all the weight of biological fact and sound common sense on its side.

I formerly advocated the retention of the 10½-inch law, and opposed any reduction of this standard, because under the present method (see No. 1 above) this would cut out almost every trace of protection afforded adult animals, the present laws being designed, as already stated, to permit the lobster to breed at least once during its lifetime. On the other hand, I am heartily in favor of reducing the legal size-limit of marketable lobsters to 9 inches, *provided the larger adults are placed in a permanently protected class.*

To apply the principle of preserving the larger, breeding adults, I should favor fixing the limits of length between which it would be legal to sell or destroy lobsters at 8 to 10 inches, permanently protecting all animals above and all below these sizes. It might be an easier step from present conditions to set these limits between the 9 and 10½ inch stages, as I am informed by Dr. Field is the plan favored by the Department of Fisheries and Game in Massachusetts. This is not a vital matter, so long as the principle of protecting the adult is main-

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tained; and this is best done by placing the bar close to the average period of sexual maturity, or approximately at the 10 or 10½ inch length.

Upon general principles, I should further retain the law prohibiting the destruction of berried female lobsters, however easily such a law may be evaded by the unconscientious fisherman.

FRANCIS H. HERRICK.

The arguments, evidence and testimony seem to prove that a change in the law, so as to make it legal to catch, possess and sell only such lobsters as are above 9 inches and not over 10½ inches, would be of advantage to the consumers, fishermen and dealers, by providing an abundant supply of lobsters throughout the year.

The Proposed Law combines Close Season and 9-Inch Law. — It would combine the best points of a close season (by putting a close season on all lobsters above 10½ inches and below 9 inches) and of a straight 9-inch law (by permitting the legal sale of lobsters between 9 and 10½ inches, size-limits which include the largest number of lobsters now caught).

Would be more readily and economically enforced. — By forbidding the use of any pot other than a legal, standard pot, with the seal of the inspector, having an entrance ring not exceeding 3 or 3¼ inches, the law could be more readily and economically enforced, since no large lobster could enter the pot, and the further possession of large lobsters would be illegal. The lower limit could be controlled by the prohibition of the use of lobsters under 8 inches as bait, or of their possession for any other purpose whatever. The temptation to keep an 8-inch lobster would be less than that involved in the possession of a large lobster.

Would increase the Number of Eggs produced. — It would immensely increase the number of eggs produced, and therefore the number of young lobsters which would by growth meet the market demand.

Would improve the Quality of Eggs produced. — By perpetually reserving the best specimens of mature age as a breeding stock, the best quality of young would be produced.

Objections. — The chief objections appear to be the difficulty of enforcement, on account of an upper and a lower limit of

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size (it should be noted that the upper limit can be cared for by an entrance ring of a specified size upon the pots or traps), and the danger that too many small lobsters would be caught.

But the crux of the whole matter is that the present laws result in a diminished yield of eggs, and to this is to be ascribed the obvious and alarming decline of the lobster in all waters where the effects of these pernicious laws have become evident; and we therefore urge upon you a most careful, judicial and prompt consideration of this important question.

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APPENDICES.

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[A.]

List of Commissioners.

United States Bureau of Fisheries, Washington, D. C.

George M. Bowers, Commissioner.
Hugh M. Smith, Deputy Commissioner.
Irving H. Dunlap, Chief Clerk.
John W. Titcomb, Assistant in charge of Division of Fish Culture.
Barton W. Everman, Assistant in charge of Division of Inquiry Respecting Food Fishes.
A. B. Alexander, Assistant in charge of Division of Statistics and Methods.
W. P. Titcomb, Disbursing Agent.
Hector von Bayer, Architect and Engineer.

Superintendents of United States Fisheries Stations.

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Charles G. Atkins, Craig Brook, East Orland, Me.
W. F. Hubbard, Nashua, N. H.
E. N. Carter, St. Johnsbury, Vt.
C. G. Corliss, Gloucester, Mass.
E. F. Locke, Woods Hole, Mass.
Livingston Stone, Cape Vincent, N. Y.
J. N. Wizner, Havre de Grace, Md.
L. G. Harron, Bryan Point, Md.
C. K. Green, Fish Lakes, Washington, D. C.
George A. Seagle, Wytheville, Va.
R. K. Robinson, White Sulphur Springs, W. Va.
Alexander Jones, Erwin Fishery, Tenn.
J. J. Stranahan, Cold Springs, Bullochville, Ga.
C. P. Henkel, Tupelo, Miss.
S. G. Worth, Edenton, N. C.
S. W. Downing, Put-in-Bay, O.
Frank N. Clark, Northville, Mich.
S. P. Wires, Duluth, Minn.
S. P. Bartlett, Quincy, Ill.
R. S. Johnson, Manchester, Ia.
H. D. Dean, Neosho, Mo.
J. L. Leary, San Marcos, Tex.
W. T. Thompson, Leadville, Col.
D. C. Booth, Spearfish, S. D.
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Claudius Wallich, Clackamas, Ore.
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Jean Allison, ... Jerome.

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W. E. Gerber, ... Sacramento.
John Birmingham, Jr., ... Pinole.
Charles A. Vogelsang, Chief Deputy, ... San Francisco.

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CONNECTICUT.

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J. D. Bush, Secretary and Treasurer, ... Wilmington.

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Honorary Fish and Game Commissioner.

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GEORGIA.

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IDAHO.

William N. Stephens, ... Rexburg.

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State Game Commissioner.

John A. Wheeler, ... Springfield.

Board of Fish Commissioners.

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KANSAS.

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J. W. Brackett,	Phillips.
Edgar E. Ring,	Orono.

Sea and Shore Fisheries.

A. R. Nickerson,	Boothbay Harbor.

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Charles F. Brook,	Montgomery County.

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Assistant Warden.

Oregon Milton Dennis,	Baltimore.

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H. G. Smith, First Vice-President, ... Minneapolis.
O. J. Johnson, Second Vice-President, ... Glenwood.
D. W. Meeker, Secretary, ... Moorehead
S. F. Fullerton, Executive Agent, ... St. Paul.

MISSOURI.

Joseph H. Rodes, ... Sedalia.

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Shellfish Commissioner.

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William McKean, District No 2, ... Sanborn.

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J. C. Porterfield, Chief Warden, ... Columbus.

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Master Fish Warden.

H. G. Van Dusen, ... Astoria.

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J. M. K. Southwick,	Newport.
Charles W. Willard,	Westerly.
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Albert Davis Mead,	Providence.
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A. O'D. Taylor,	Newport.

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Utah.

John Sharp,	Salt Lake City.

Vermont.

Henry G. Thomas,	Stowe.

Washington.

T. R. Kershaw,	Bellingham.

West Virginia.

Game and Fish Warden.

James H Marcum,	Huntington.

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State Warden.

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Commissioners of Fisheries.

The Governor, Ex Officio.	
Calvert Spensley, President,	Mineral Point.
Jas. J. Hogan, Vice-President,	La Crosse.
E. A. Birge, Secretary,	Madison.
William J. Starr,	Eau Claire.
Henry D. Smith,	Appleton.
Jabe Alford,	Madison.
A. A. Dye,	Madison.
James Nevin, Superintendent,	Madison.

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[B.]

Distribution of Food Fish.

Brook Trout.

Fry distributed from the Sutton Hatchery during April and May, 1905.

Applicant.	Name of Brook.	Town.	Number.
Alfred Read,	Barry,	Westfield,	5,000
Ward Rees,	Tekoa,	Westfield,	5,000
L. A. Pierce,	Smith,	Westfield,	5,000
George Bowers,	Root,	Westfield,	5,000
R. R. Andrews,	Ponders Hollow,	Westfield,	5,000
F. A. Pierce,	Sodom,	Westfield,	5,000
J. B. Hazelton,	Slab,	Westfield,	5,000
L. H. Bowers,	Kellogg,	Westfield,	5,000
Robert L. Soper,	Oak Orchard,	Westfield,	5,000
Wm. A. Soper,	Jacks,	Westfield,	5,000
W. J. Morton,	Cold Spring,	Westfield,	5,000
W. T. Thomas,	Hollister,	Westfield,	5,000
C. F. Cowdry,	Mulpus,	Lunenburg,	5,000
C. F. Cowdry,	Bixby,	Ashby,	5,000
C. A. Hunter,	Robins,	Concord,	5,000
L. N. Fowler,	Heyward's,	Concord,	5,000
John A. Buguey,	Harrington's,	Concord,	5,000
Thomas Curry,	Sheehan,	Concord,	5,000
David L. Ball,	Anglers,	Concord,	5,000
Chas. B. Adams,	Brown and Potash,	Webster,	5,000
Chas. B. Adams,	Simpson,	Webster,	5,000
P. S. Callahan,	Bemis,	Sturbridge,	5,000
O. L. Howlett,	Marcy,	Holland,	5,000
E. E. Whiting,	Mechanic,	Upton,	5,000
L. F. Despeaux,	Mill,	Upton,	5,000
Patrick Shaughnessy,	Bernard,	Upton,	5,000
E. C. Vinton,	Hudson,	Grafton,	5,000
F. A. Anderson,	Cold Spring,	Grafton,	5,000
George Pogue,	George,	Grafton,	5,000
Wm. Gillespie,	Axtell,	Grafton,	5,000
Horace H. Adams,	Adams,	Grafton,	5,000
Geo. E. Whitehead,	McCracken and Carters,	Millbury,	5,000
Wm. L. Taft,	Poor Farm,	Northbridge,	5,000
Geo. L. Gill,	Carpenter,	Northbridge,	5,000
C. V. Dudley,	Prentice,	Northbridge,	5,000
W. E. Johnson,	Purgatory,	Northbridge,	5,000
A. S. Noyes,	Burt,	Northbridge,	5,000
Cyrus H. Mentzer,	Cold Harbor,	Northborough,	5,000
Wm. A. Gaines,	Edgell's,	Framingham,	5,000
Arthur E. French,	Thayer,	Palmer,	5,000
C. L. Allen,	Barber,	Worcester,	5,000
H. A. Sharp,	Diamond,	Norfolk,	5,000
Geo. B. Green,	Canoe River,	Mansfield,	5,000
E. L. Freeman,	Gurney,	Medway,	5,000
L. C. Humphrey,	Doggetts,	Rochester,	5,000
G. F. Prevear,	McGovern's,	Leominster,	5,000
G. F. Prevear,	Lunenburg,	Leominster,	5,000
G. F. Prevear,	Fall,	Leominster,	5,000
G. F. Prevear,	Pottery,	Leominster,	5,000
G. F. Prevear,	Chauchit,	West Sterling,	5,000
Hobart Raymond,	–	–	5,000
Gilbert Flagg,	–	–	5,000
Chas. Grimes,	Cook,	Hubbardston,	5,000
E. A. Woodward,	Natty,	Hubbardston,	5,000

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Fry distributed from the Sutton Hatchery, etc. — Concluded.

Applicant.	Name of Brook.	Town.	Number.
Alfred C. Murdock,	Davis Meadow,	Hubbardston,	5,000
L. H. Ruggles,	Moose,	Hardwick,	5,000
Jas. H. O'Hara,	Sheldon,	Deerfield,	5,000
Jas. H. O'Hara,	Old World,	Deerfield,	5,000
Jas. H. O'Hara,	Stickney,	Shelburne,	5,000
Patrick Shaughnessy,	Bernard,	West Upton,	5,000
E. E. Whiting,	Mechanic,	West Upton,	5,000
L. F. Despeaux,	Mill,	West Upton,	5,000
			310,000

Fry distributed from the Adams Hatchery during April and May, 1905.

Joseph D. Fontaine,	Punch and Simonds,	Greenfield,	30,000
Joseph D. Fontaine,	Cherry Rum and Fisk,		
Joseph D. Fontaine,	First Gorge and Second Gorge,		
Chas. F. Jacobus,	Gill Schoolhouse and Dry,	Turner's Falls,	5,000
N. P. Farwell,	Dry,	Gill,	5,000
Farwell Pfernick,	Clark,	Buckland,	30,000
John L. Halgis,	Drake,	Buckland,	
Wm. H. Noonan,	Dragon,	Shelburne,	
W. G. Rotherham,	Apple Valley,	Shelburne,	
J. S. Outhouse,	Avery,	Charlemont,	
James W. Wild,	Wilder,	Charlemont,	
Frank W. Rice,	Town and Wood,	Lanesborough,	10,000
Geo. F. Sayles,	Dry,	Adams,	5,000
Geo. F. Sayles,	Bassett,	Adams,	5,000
Harry J. Sheldon,	Gordon,	Adams,	5,000
James H. Krum,	Tunnel,	North Adams,	5,000
James H. Krum,	Hudson,	North Adams,	5,000
James H. Krum,	Sherman,	North Adams,	5,000
C. H. Sage,	–	Great Barrington,	15,000
C. H. Sage,	–		
C. H. Sage,	–		
H. O. Hicks,	Cold River,	Adams,	5,000
L. B. Moore,	Slater,	Tryingham,	15,000
L. B. Moore,	Jerusalem,		
L. B. Moore,	Riverside,		
H. F. Barrett,	East Hoosac,	Adams,	5,000
B. H. Shaw,	Walker,	Windsor,	5,000
E. L. Bird,	Hollis,	Windsor,	5,000
W. S. Hathaway,	Hathaway,	Savoy,	5,000
J. A. Morrison,	Cold,	Middlefield,	5,000
John Z. Frizzell,	Fuller, Pierce and Trout,	Peru,	10,000
J. G. Bennett,	Pettibone,	Cheshire,	5,000
J. M. Burns,	Smith,	Pittsfield,	15,000
J. M. Burns,	Shaker,		
J. M. Burns,	Sackett,		
S. G. Tenney,	Idlewild,	Williamstown,	10,000
A. P. Ramage,	Dunbar,	Monroe,	5,000
			215,000

Fry distributed from the Winchester Hatchery during April and May, 1905.

W. F. Davis,	Gallagher's,	Acton,	3,000
J. Sidney White,	Cole's,	Acton,	3,000
J. Sidney White,	Wills',	Acton,	3,000
Clifford Poor,	Pearl and tributaries,	Boxford,	3,000
Clifford Poor,	Pearl and tributaries,	Boxford,	3,000
Clifford Poor,	Pearl and tributaries,	Boxford,	3,000
Clifford Poor,	Pearl and tributaries,	Boxford,	3,000
Caleb L. Smith,	Golden Cove,	Chelmsford,	3,000
Wm. A. Lang,	Ambrose Hale,	Billerica,	3,000
Geo. W. Alcott,	Golden Cove,	Chelmsford,	3,000
F. A. Griffin,	Nashoba,	Westford,	3,000

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Fry distributed from the Winchester Hatchery, etc. — Concluded.

Applicant.	Name of Brook.	Town.	Number.
Henry Boynton,	Black,	Lowell,	3,000
Wm. E. Badger,	Trull's and Hood's,	Tewksbury,	3,000
H. S. Crysler,	Crooked Spring,	Chelmsford,	3,000
Ernest N. Schofield,	Argella and Mill,	Groveland,	6,000
Ernest N. Schofield,	Grindle and Morrill's,	Groveland,	6,000
Chas. M. Kimball,	Houghton's,	South Acton,	3,000
Chas. M. Kimball,	Rocky,	South Acton,	3,000
Chas. M. Kimball,	Cemetery,	South Acton,	3,000
Chas. M. Kimball,	Taylor's,	South Acton,	3,000
Wm. Finucane,	— — —	Methuen,	3,000
A. S. Mitchell,	Brown's,	Lexington,	3,000
H. M. Monroe,	Trout,	Lexington,	3,000
Edward S. Payson,	Grassland,	Lexington,	3,000
O. W. Whittemore,	Mill,	Arlington,	3,000
N. J. Hardy,	Reed's,	Arlington,	3,000
Roswell Wetherbee,	Ryan's,	Lexington,	3,000
M. E. S. Clemons,	Causeway and Witham's,	Andover,	3,000
Joshua D. Upton,	Willis,	North Reading,	3,000
John H. Sweetser,	Hall's,	Woburn,	3,000
Wm. J. Hammond,	Cutler's,	Woburn,	3,000
Chas. H. Buss,	Lincoln,	Woburn,	3,000
Charlie A. Jones,	Shaker Glen,	Woburn,	3,000
C. C. Taylor,	Cutler's,	Woburn,	3,000
Frank W. Ames,	McManus,	Woburn,	3,000
John T. Hill,	Sandy,	Woburn,	3,000
Frank W. McIntosh,	Fowle,	Bedford,	3,000
S. M. Hawey,	Bennett,	Burlington,	3,000
Lewis A. White,	Sandy,	Burlington,	3,000
Chas. E. Taylor,	Walker's,	Burlington,	3,000
E. C. Farwell,	Tributary Ipswich River,	Reading,	3,000
Arthur Roberts,	Huckleberry,	Reading,	3,000
Geo. W. Lovell,	Tan Yard,	Middleborough,	3,000
S. E. Bisbee,	Bennett's,	Middleborough,	3,000
Willard Osborn,	Green Bottom,	Lakeville,	3,000
John Moody,	Clark's,	Middleborough,	3,000
Harry K. Perkins,	Linus Snow,	Bridgewater,	3,000
Arthur J. Wallen,	Ice House,	Campello,	3,000
John J. Kennedy,	Dead Meadow,	Stoughton,	3,000
Walter H. Edgerly,	Meadow,	West Bridgewater,	3,000
C. H. Leonard,	Ford's,	Middleborough,	6,000
Seth Damon,	Old Swamp River,	Weymouth,	3,000
Geo. L. Peabody,	Plyer,	Hanover,	3,000
Geo. L. Peabody,	Silver,	Hanover,	3,000
R. R. Freeman,	Town Brook,	Wellfleet,	3,000
Maynard D. Orr,	Wyne,	Rockport,	5,000
Murray J. Bowen,	North branch Palmer's River,	Rehoboth,	3,000
George W. Field,	Beaver Hole Brook,	Sharon,	5,000
Geo. F. Pearson,	Marshall's,	Lowell,	3,000
			190,000

Fry distributed from the Hadley Hatchery during April and May, 1905.

F. M. Smith,	Leaping Well,	South Hadley,	4,000
S. E. Bliss,	Leaping Well,	South Hadley,	4,000
Geo. Hoffman,	Buttery,	South Hadley,	4,000
B. C. Brainard,	Buttery,	South Hadley,	4,000
F. E. White,	Elmer, east branch,	South Hadley,	4,000
John Shields,	Elmer, west branch,	South Hadley,	4,000
Charles H. Sawyer,	Running Gutter,	Hatfield,	5,000
T. F. Ahern,	Ahern Brook,	Sunderland,	5,000
Peter McHugh,	Board,	Northampton,	5,000
Edward Miller,	Robert's Meadow,	Northampton,	5,000
Louis Gaylor,	Parsons,	Northampton,	5,000
Wm. H. Felker,	Loudville,	Westhampton,	5,000
Eli M. Converse,	Pierces,	West Brookfield,	5,000
J. B. Haskins,	Allen,	West Brookfield,	5,000
C. H. Clark,	Kent Meadow,	West Brookfield,	5,000

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Fry distributed from the Hadley Hatchery, etc. — Concluded.

Applicant.	Name of Brook.	Town.	Number.
C. E. Bill,	White,	West Brookfield,	5,000
E. W. Lawton,	Elwell,	Ware,	5,000
M. C. Wood,	Sampson,	Ware,	5,000
M. W. Smith,	Hampshire,	Goshen,	5,000
F. E. Hawkes,	Rogers,	Goshen,	5,000
John Doherty,	Packard,	Goshen,	5,000
W. A. Smith,	Highland,	Goshen,	5,000
W. S. Gabb,	Nipping,	Cummington,	5,000
W. S. Gabb,	Clark,	Cummington,	5,000
W. S. Gabb,	Shaw,	Cummington,	10,000
W. S. Gabb,	Mitchell,	Cummington,	10,000
Henry L. Pierce,	Paige,	Barre,	10,000
John S. Rice,	Tolman,	Barre,	5,000
Geo. R. Simonds,	Prince,	Barre,	10,000
M. R. Goddard,	Hubbardston,	Hubbardston,	5,000
B. F. Pierce,	Hubbardston,	Hubbardston,	5,000
Stewart K. Pierce,	Ragged Hill,	Hubbardston,	5,000
Chas. A. Brown,	Lovewell,	Hubbardston,	5,000
H. L. Shepardson,	No name given,	Phillipston,	5,000
Chas. N. Dyer,	Conesto,	Hubbardston,	5,000
Arthur W. Pratt,	Bailey,	Gardner,	5,000
Edward L. Knowlton,	Poor Farm,	Gardner,	5,000
C. E. Barron,	Moores,	Westminster,	5,000
C. T. Mellen,	Bigelow Hill,	Westminster,	5,000
J. W. Toner,	Cooledge,	Gardner,	5,000
A. H. Jefts,	Sanger,	Athol,	5,000
L. P. Hapgood,	Buckman,	Athol,	5,000
Ezra O. Bradford,	Ellinwood,	Athol,	5,000
N. P. Farwell,	Fall River,	Bernardston,	10,000 [1]
Chas. F. Jacobus,	Dry and Clark,	Gill,	13,000 [1]
Harland M. King,	Wheeler,	Athol,	4,000
Robert Brookhouse, Jr.,	Rice,	Athol,	4,000
M. B. Waterman,	Sanger,	Athol,	4,000
A. G. Wesley,	Sweetwater or Wright,	Athol,	4,000
E. B. Newton,	Ellinwood,	Athol,	4,000
J. W. Jackson,	Gillard and Olds,	Belchertown,	5,000
			279,000

[1] These lots were brown trout.

Fingerling Brook Trout Plants.

C. B. Sampson,	Broad,	Holyoke,	500
Arthur E. Fitch,	Thayer,	Palmer,	500
H. D. Moulton,	Moulton and Creamery,	Monson,	500
Everett Flood,	Tributary to West Reservoir,	Monson,	500
Wm. H. Roberts *et al.*,	Poor,	Chicopee Falls,	500
Alfred Read *et al.*,	Powder Mill,	Westfield,	1,000
J. F. Barrett,	Tributary of Ware River,	Barre,	250
H. L. Pierce,	Tributary of Prince River,	Barre,	250
H. O. Elliott,	Willow,	Ashburnham,	250
H. G. Howard,	Cooper,	Ashburnham,	250
Walter Aiken,	Trout,	Templeton,	250
L. N. Hadley,	Trout,	Templeton,	250
John C. Dudley,	Ellis,	Sutton,	250
J. E. Stuart,	Bigelow and Goodridge,	Westminster,	500
C. L. Allen,	Barber's,	Worcester,	250
P. A. Dowd,	Weasel,	Worcester,	250
F. L. Hager,	Beaman's,	Winchendon,	250
George Pogue *et al.*,	Cold Spring,	Grafton,	500
F. S. Casavant *et al.*,	Bailey,	Gardner,	1,000
E. A. Woodward,	Tannery,	Hubbardston,	500
C. E. Bill *et al.*,	White,	West Brookfield,	500
Chas. W. Eggleston,	Mad,	North Brookfield,	500
C. F. Cowdry *et al.*,	Bixby,	Townsend,	500
C. F. Cowdry *et al.*,	Mulpus,	Lunenburg,	500
H. W. Barnes *et al.*,	Purgatory,	Northbridge,	500
Charles B. Adams,	Potash,	Webster,	500
Geo. F. Prevear *et al.*,	Tophet,	Shirley,	500

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Fingerling Brook Trout Plants — Continued.

Applicant.	Name of Brook.	Town.	Number.
P. S. Callahan,	Highland,	Fiskdale,	250
W. F. Knowlton,	Bummit,	Shrewsbury,	500
A. D. Barnes,	Hobbs,	Sturbridge,	250
James A. Holden,	Ball,	Holden,	250
J. Frank Stone,	Great,	East Brookfield,	250
Geo. W. Boutel *et al.*,	Riceville,	Athol,	500
Chas. O. Flagg,	Great Meadow,	Hardwick,	250
L. H. Ruggles,	Moose,	Hardwick,	250
Leo Clarke,	Fox,	Millville,	250
E. E. Whiting *et al.*,	Mill and Mechanic,	West Upton,	500
H. C. Capen *et al.*,	Howe,	Spencer,	500
Geo. E. Whitehead,	Carter's and McCracken,	Millbury,	250
George S. Sayles,	Gulf,	Cheshire,	250
F. N. Haskins,	Haskins,	Savoy,	250
John Z. Frizzell,	Tuttle,	Peru,	250
James M. Burns,	Yokum and Shaker,	Pittsfield,	1,000
Frank W. Rice,	Town,	Lanesborough,	500
Frank W. Rice,	Northrup,	Lanesborough,	250
H. A. Barton,	Barton,	Dalton,	250
F. N. Groesbeck,	Brown,	Dalton,	250
P. J. Clark,	Potash,	Hinsdale,	500
F. H. Pierce *et al.*,	Pierce,	Windsor,	250
L. B. Moore,	Branch of Hop Brook,	Tyringham,	250
H. O. Hicks *et al.*,	Topliet, right branch,	Adams,	1,000
C. L. Crafts,	Roaring,	Whately,	250
W. G. Rotherham *et al.*,	Clesson's,	Ashfield and Buckland,	1,000
Sigmond Klaiber *et al.*,	Fall River,	Gill,	1,000
C. R. Hills,	Fall River,	Bernardston,	250
Jas. H. O'Hara *et al.*,	Glen,	Leyden,	1,000
A. S. Hunt *et al.*,	Middle branch Swift River,	Orange,	1,000
W. M. Niles *et al.*,	Rice,	Charlemont,	500
James Donoghue,	Barker's,	Methuen,	500
Edwin J. Castle,	Ward's,	Andover,	250
Ernest N. Schofield,	Grindle,	Groveland,	750
Clifford Poor,	Pearl,	Boxford,	500
T. L. Jenkins,	Gallup's,	Topsfield,	250
Hiram A. Young,	Mitchell,	Beverly,	250
Warren H. Beede,	Outlet,	Peabody,	500
Moody Kimball,	Tanhouse,	Rowley,	250
Oliver A. Bailey,	Dow,	Ipswich,	250
F. T. Slater,	Alewife,	Gloucester,	250
Walter H. Edgerly,	Town Stream,	West Bridgewater,	250
Thomas W. Frost,	Trout,	Brockton,	250
D. W. Wright,	Holloway,	Lakeville,	250
Arthur J. Wallen,	Icehouse,	Campello,	250
Geo. L. Peabody,	Silver and Plyer,	Hanover,	250
E. A. McMaster,	Breck's,	Bridgewater,	250
S. E. Bisbee *et al.*,	Alden,	Middleborough,	1,000
Edward N. Ames,	Foster's Meadow,	Wilmington,	250
A. S. Mitchell *et al.*,	Mouroe's,	Lexington,	250
H. P. Anderson,	Hop,	Hudson,	250
E. C. Farwell,	Tributary to Ipswich River,	Reading,	250
F. B. Twitchell,	Noanet,	Dover,	125
Chas. M. Kimball,	Nagog,	South Acton,	1,000
Loring N. Fowler *et al.*,	Second Division,	Concord Junction,	250
C. A. Hunter,	Robins,	Concord,	250
F. I. Knight,	Woods,	Townsend,	250
N. J. Hardy,	Lock,	Arlington,	250
W. A. Kemp,	Sucker,	Pepperell,	250
H. E. Hersam,	Cemetery,	Stoneham,	250
A. Ward Follett,	Ryan's,	North Lexington,	250
Chas. N. Hargraves,	Baiting,	Framingham,	250
James Menzies,	Swain's,	North Chelmsford,	375
Geo. F. Pearson,	Marshall's,	Lowell,	375
C. M. Griffin,	Vine,	Westford,	250
Joseph Rudolph,	Hunting-house,	Myricks,	250
Murray J. Bowen,	Branch of Palmer's River,	Rehoboth,	250
H. R. Packard *et al.*,	Bungy,	Attleborough,	500
Walter C. Slocum,	Tuxet,	Dartmouth,	250
George B. Treen,	Lowland,	Mansfield,	250
Rev. Jas. J. Brady,	Herring River,	Rochester,	250
Seth Damon,	Mill,	Weymouth,	500

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Fingerling Brook Trout Plants — Concluded.

Applicant.	Name of Brook.	Town.	Number.
George B. Clark,	Trap-hole,	East Walpole,	500
John J. Kennedy,	Dead Meadow,	Stoughton,	500
J. A. Davis *et al.*,	Flat,	Ware,	500
Edward Miller *et al.*,	Parsons and Robert's Meadow,	Northampton,	1,000
F. M. Smith,	Buttery,	South Hadley,	1,000
R. D. Blabee,	Page,	Chesterfield,	250
E. P. Bartlett *et al.*,	Cook,	Pelham,	500
J. W. Jackson,	Pudding Mill,	Belchertown,	250
W. S. Gabb,	Shaw,	Cummington,	500
J. A. Morrison,	Factory,	Middlefield,	250
Jas. F. Page *et al.*,	Plum,	South Amherst,	1,000
			45,875

Ponds stocked and closed in Accordance with Chapter 91, Section 19, Revised Laws, as amended by Chapter 274, Acts of 1903.

Name of Pond.	Town.	Rainbow Trout Fingerlings.	Brown Trout Fingerlings.	Landlocked Salmon Fingerlings.	Pike Perch Fry.	Smelt Eggs.	Brook Trout Fingerlings.
Lashaway Lake,[1]	Brookfield,	500	–	–	–	–	–
Onota Lake,	Pittsfield,	500	–	1,000	–	–	–
Foster's,	Andover,	500	–	–	–	–	–
Dennison Lake,	Winchendon,	500	–	–	–	–	–
Naukeag Lake,	Ashburnham,	500	–	500	–	–	1,000
Crystal Lake,	Gardner,	500	–	1,000	–	2,000,000	–
Nabnasett,	Westford,	500	–	–	–	–	–
Whalom Lake,	Lunenburg,	500	–	–	–	–	–
Round,	Tewksbury,	500	–	–	–	–	–
Garfield Lake,	Monterey,	–	–	1,000	–	–	–
Walden,	Concord,	–	–	500	–	2,000,000	1,000
Peters,	Dracut,	–	500	–	–	2,000,000	–
Nagog,	Acton and Littleton,	–	500	500	–	2,000,000	–
Robins,	East Bridgewater,	–	500	–	–	–	–
Cooper's,	North Carver,	–	500	–	–	–	–
Whitman's,	Weymouth,	–	500	–	–	–	–
Lead Mine,	Sturbridge,	500	–	–	100,000	–	–
Big Alum,	Sturbridge,	–	500	–	–	–	–
Winnecunnett,	Norton,	–	500	–	–	–	–
		5,000	3,500	4,500	100,000	8,000,000	2,000

[1] Stocked upon evidence that in 1794 it was a great pond of the State. Later investigations satisfied the commissioners that it is an artificial pond, made by a dam erected in 1785, and therefore private property.

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PONDS RESTOCKED IN 1905.

NAME OF POND.	Town.	Rainbow Trout Fingerlings.	Brown Trout Fingerlings.	Landlocked Salmon Fingerlings.	Pike Perch Fry.	Brown Trout Fry.	Smelt Eggs.	Adult Brook Trout.
Haggett's,	Andover,	-	500	-	-	-	-	-
Baddacook,	Groton,	-	500	-	-	5,000	-	-
Long,	Royalston,	500	-	-	100,000	-	-	-
Forge,	Littleton,	500	-	-	-	-	-	-
Spectacle,	Littleton,	-	-	1,000	-	-	-	-
Flax,	Lynn,	500	-	-	-	-	-	-
Queen,	Phillipston,	500	-	-	-	-	-	-
North,	Orange,	-	-	1,000	-	-	2,000,000	-
Massapoag,	Sharon,	-	-	-	100,000	-	4,000,000	-
Pleasant,	Wenham,	-	-	-	100,000	-	-	-
Long,	Tewksbury,	-	-	-	100,000	-	-	-
Long,	Freetown,	-	-	-	100,000	-	-	-
Great,	North Andover,	-	-	-	100,000	-	-	-
Quannapowitt,	Wakefield,	-	-	-	100,000	-	-	-
Packard,	Orange,	-	-	-	-	-	2,000,000	-
Greenwater,	Becket,	-	-	-	-	-	2,000,000	-
Assowompsett,	Lakeville,	-	-	-	-	-	2,000,000	-
Forest,	Palmer,	-	-	-	-	-	-	28
Chaubunagungamaug,	Webster,	-	-	-	-	-	-	40
		2,000	1,000	2,000	700,000	5,000	12,000,000	68

BROOK STOCKED WITH BROOK TROUT AND CLOSED IN ACCORDANCE WITH SECTION 5, CHAPTER 91 OF THE REVISED LAWS.

NAME OF BROOK.	Town.	Number.
South Meadow Brook,	Shrewsbury,	200

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[C.]

Distribution of Pheasants.

Pheasants were liberated in the covers in various sections of the State, as indicated in the following list, which also embraces the names of applicants for birds: —

Applicant.	Town.	Number.
George H. Haines,	Sandwich,	6
Arthur J. Wallen,	Campello,	6
L. D. Baker,	Wellfleet,	6
Seth Damon,	Weymouth,	6
Charles S Baker,	Falmouth,	6
A. I. Bailey,	Middleborough,	6
Frank H. Shute,	Gloucester,	6
Amos A. Phelps,	Rockland,	6
Murray D. Lincoln,	Raynham,	6
James Lehan,	Stoughton,	6
Charles H. Walker,	Amesbury,	6
Frank M. Chace,	Fall River,	6
James E. Donoghue,	Lawrence,	10
Fred P. Smith,	Dedham,	10
W. H. Reynolds,	Braintree,	10
John N. Cole,	Andover,	10
J. Sidney White,	North Acton,	10
Wellington K. Henry,	Pittsfield,	8
H. P. Wookey,	Stockbridge,	8
Frank Cass,	Franklin,	8
John C. Dudley,	Wilkinsonville,	8
Edward E. Whiting,	West Upton,	8
S. Frank Stockwell,	Auburn,	8
James Lehan,	Stoughton,	10
W. C. Woodward,	Middleborough,	10
Charles M. Kimball,	South Acton,	10
Warren H. Beede,	Lynn,	10
Edward B. Nevin,	South Weymouth,	10
Edward F. Woods,	West Newton,	10
Walter H. Edgerly,	Bridgewater,	10
Charles E. Conant,	Dedham,	10
Norman E. Lemaire,	Taunton,	10
Franklin S. Simmons,	Somerset,	10
Guy C. Wonson,	Gloucester,	10

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Applicant.	Town.	Number.
John Kenrick,	Orleans,	10
Edward G. Clark,	Westfield,	10
George W. Field,	Sharon,	12
William H. Frost,	Athol,	10
Sanborn G. Tenney,	Williamstown,	10
Dana Malone,	Greenfield,	10
Edward Miller, Secretary,	Northampton,	10
George W. Lovell,	Middleborough,	10
A. P. Wright,	Chesterfield,	10
C. M. Pettengill,	Cummington,	10
A. C. Stevens,	Worthington,	10
Edward F. Staples,	East Taunton,	10
William T. Swain,	Nantucket,	10
F. H. Smith,	South Hadley,	10
C. F. Jacobus,	Turner's Falls,	10
C. H. Morse,	Petersham,	10
W. H. Walker,	Greenwich,	10
Francis C. Packard,	Quincy,	10
George W. Field,	Sharon,	6
		468

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[D.]

Distribution of Belgian Hares.

Applicant.	Town.	Number.
Arthur J. Wallen,	Campello,	8
George H. Haines,	Sandwich,	8
A. I. Bailey,	Middleborough,	8
C. S. Baker,	Falmouth,	8
James Lehan,	Stoughton,	8
Clifton Fears,	Rockport,	8
Charles H. Carroll,	Gloucester,	8
Arthur S. Aborn,	Wakefield,	8
Charles M. Kimball,	South Acton,	8
Sanborn G. Tenney,	Williamstown,	16
Guy C. Wonson,	Gloucester,	10
John N. Cole,	Andover,	10
W. H. Reynolds,	Braintree,	10
John C. Dudley,	Sutton,	10
J. F Despeaux,	West Upton,	10
C. E. Conant,	Dedham,	15
Fred Skinner,	Lynnfield Centre,	15
Ernest H. Ives,	Reading,	8
		176

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[E.]

Arrests and Convictions.

Report upon Convictions, Fines, etc., for Violations of the Fish and Game Laws.

State v.—	Town or City.	Offence.	Court Decision.	Fine.	Remarks.
George W. Sampson,	New Bedford,	Taking shellfish (R. L., c. 91, § 114),	Convicted,	$5 00	Failed to pay; jail.
Wm. B. Noones,	New Bedford,		Convicted,	5 00	
Vasco Page,	New Bedford,		Convicted,	5 00	
Manuel Oliver,	New Bedford,		Convicted,	5 00	
Manuel Pocheco,	New Bedford,		Convicted,	5 00	
Manuel Antone,	New Bedford,		Convicted,	5 00	
Joseph Santos,	New Bedford,		Convicted,	5 00	
John P. Boland,	Dartmouth,		Convicted,	5 00	
Peter J. Forehand,	Dartmouth,		Convicted,	5 00	
Joseph Gomes,	Dartmouth,		Convicted,	5 00	Arrested March 8, second offence, nol prossed.
Joseph Costa,	Dartmouth,		Convicted,	5 00	
Joseph Frasier,	Dartmouth,		Convicted,	5 00	
Frank Medaros,	Dartmouth,		Convicted,	5 00	
Henry Souza,	Dartmouth,		Convicted,	5 00	
Antone Gracia,	Dartmouth,		Convicted,	5 00	
Joseph Mello,	Dartmouth,		Convicted,	5 00	
Manuel J. Silva,	Dartmouth,		Convicted,	5 00	
Alphonse Beaudry,	Dartmouth,		Convicted,	5 00	
John Cook,	Dartmouth,	Illegal possession of twenty-six rabbits,	Convicted,	10 00	Appealed; withdrew and settled.
Octave Benjamin,	New Bedford,	Illegal possession of two rabbits,	Convicted,	Filed.	
George A. Burns,	Tiverton, R. I.,	Illegal fishing, Westport,	Convicted,	10 00	
Frank Stevenson,	Tiverton, R. I.,	Setting nets, Westport,	Convicted,	Filed.	
John Doe,	New Bedford,	Taking shellfish (R. L., c. 91, § 114),	Convicted,	Filed.	
Manuel Ferris,	New Bedford,		Convicted,	Filed.	
Joseph Sylvia,	New Bedford,		Convicted,	Filed.	
Arthur A. Reed,	Fall River,	Owning dog that chased deer,	Discharged,	-	
Wm. E. Reed,	Fall River,		Discharged,	-	

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Charles McCarthy,	South Boston,	Short lobsters,	Convicted,	Filed.	
Oliver Desforge,	Fall River,	Song birds in possession,	Discharged,	—	
John Outsell,	Fall River,	Short bass,	Convicted,	10 00	
Albert M. Chase,	Providence, R. I.,	Hunting woodcock and partridge,	Convicted,	20 00	
Thomas Holland,	Fairhaven,	Taking clams (R. L., c. 91, § 114),	Convicted,	Filed.	
Charles Reynolds,	Fairhaven,		Convicted,	Filed.	
William Warren,	Fairhaven,		Convicted,	Filed.	
John Watson,	New Bedford,		Convicted,	Filed.	
Joseph Lepoint,	New Bedford,		Convicted,	5 00	
Luca Allen,	New Bedford,		Convicted,	5 00	
Louis Wagner,	New Bedford,		Convicted,	5 00	
B. F. Chadwell,	New Bedford,		Convicted,	5 00	
Zebb Chadwell,	New Bedford,	Taking quahaugs (R. L., c. 91, § 114),	Convicted,	Filed.	
Zachariah Chadwell,	New Bedford,		Convicted,	Filed.	
Frederick Brellou,	New Bedford,		Convicted,	5 00	
Joseph Ganeove,	New Bedford,		Convicted,	5 00	
Manuel Francis,	New Bedford,		Convicted,	5 00	
Manuel Lawrence,	New Bedford,		Warrant out,	—	
Nequolian Lawrence,	New Bedford,	Taking clams (R. L., c. 91, § 114),	Convicted,	5 00	Went to jail.
Alfonsys Damos,	New Bedford,	Taking quahaugs (R. L., c. 91, § 114),	Convicted,	5 00	
Lawrence Lynch,	New Bedford,	Taking scallops,	Convicted,	Filed.	
Harry H. Sheyard,	Fairhaven,	Taking clams (R. L., c. 91, § 114),	Convicted,	Filed.	
Peter Murphy,	Acushnet,	Hunting on Lord's Day,	Convicted,	10 00	
Wm. H. Dyer,	New Bedford,	Taking clams (R. L., c. 91, § 114),	Discharged,	—	
George M. Dexter,	New Bedford,		Convicted,	5 00	Went to jail.
Arthur Maher,	New Bedford,	Short pickerel,	Convicted,	2 00	
Henry Maher,	New Bedford,		Convicted,	2 00	
Edward Lewis,	Acushnet,		Convicted,	2 00	
William A. Hammond,	Fairhaven,	Taking clams (R. L., c. 91, § 114),	Convicted,	5 00	Went to jail.
Joseph Durfriesic,	New Bedford,		Convicted,	5 00	
Joseph Richards,	New Bedford,	Taking quahaugs (R. L., c. 91, § 114),	Convicted,	5 00	
Levi Burgess,	New Bedford,		Convicted,	10 00	Went to jail.
Joseph Carvalho,	New Bedford,	Hunting without license; killing song birds (ten robins),	Convicted,	60 00	$50 on first charge, $50 on second.
Louis Sielly,	Fall River,		Convicted,	50 00	Went to jail.
William Peil,	New Bedford,		Convicted,	10 00	
Fred Robinson,	New Bedford,		Convicted,	10 00	
William Robinson,	New Bedford,	Hunting on Lord's Day,	Convicted,	10 00	
Edward Morrison,	New Bedford,		Convicted,	10 00	
John H. Hammerschmidt,	New Bedford,		Convicted,	10 00	
Joseph Hammerschmidt,	New Bedford,	Taking clams (R. L., c. 91, § 114),	Convicted,	Filed.	
George Hammerschmidt,	New Bedford,		Convicted,	10 00	
William H. Davis,	Dartmouth,	Hunting on Lord's Day,	Convicted,	5 00	
Jerome Stowell,	Dartmouth,		Convicted,	5 00	
Manuel Frates,	Fairhaven,	Taking clams (R. L., c. 91, § 114),	Convicted,	10 00	
George A. Daniels,	Fairhaven,		Convicted,	10 00	

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Report upon Convictions, Fines, etc., for Violations of the Fish and Game Laws— Continued.

State v. —	Town or City.	Offence.	Court Decision.	Fine.	Remarks.
Hector Brodie,	Groveland,		Convicted,	$100 00	Failed to pay; two months, house of correction.
David Forbush,	Lynn,	Killing a deer,	Convicted,	100 00	Appealed; discharged.
Russell Forbush,	Lynn,		Convicted,	100 00	Appealed; discharged.
Herbert Myers,	Lynn,		Convicted,	100 00	Appealed; discharged.
Austin W. Flint,	Danvers,	Six smelts, close season,	Convicted,	6 00	
William Driscoll,	Scituate,	Eighteen short lobsters,	Convicted,	36 00	Appealed; paid.
Miles F. Gordon,	Crescent Beach,	Five lobster tails,	Discharged,	-	
Angelo Arrubino,	Saugus,	Hunting on Lord's Day; hunting without license,	Convicted,	20 00	
Irwin C. Paine,	Marblehead,	Hunting on Lord's Day; using ferret,	Convicted,	20 00	Sunday charge filed.
D. H. Finnegan,	Marblehead,		Convicted,	20 00	Sunday charge filed.
William J. Ryan,	Revere,	Hunting on Lord's Day,	Discharged,	-	
John Lindberg,	Winthrop,	Twenty short lobsters,	Convicted,	20 00	
Hartley Wells,	Winthrop,	Three short lobsters,	Convicted,	15 00	
Joaquin P. Silva,	Peddocks Island,	Fourteen short lobsters,	Convicted,	52 00	
Elvin W. Taylor,	Hough's Neck,	Robbing traps; short lobsters,	Convicted,	26 00	Robbing traps filed.
Dolor Martell,	Hough's Neck,		Defaulted,	-	
Antone Viera,	Boston,	Thirty-eight short lobsters,	Convicted,	38 00	
Frank Brengoli,	Boston,	Four shorts, one seed lobster,	Convicted,	15 00	
Joseph Longone,	Chelsea,	Hunting without license,	Convicted,	10 00	
Lorenzo B. Creamer,	Everett,	Hunting on Lord's Day,	Convicted,	10 00	Appealed; paid.
William Musgrave,	Everett,		Convicted,	10 00	Appealed; paid.
John Fisher,	Cohasset,	Hunting on Lord's Day; having one bird,	Convicted,	15 00	
L. W. Morrison,	Braintree,	Twenty-two short lobsters,	Convicted,	33 00	
Thomas Mitchell,	South Boston,	Hunting on Lord's Day; having	Convicted,	15 00	
John Carlson,	South Boston,	three birds,	Convicted,	15 00	
Lewis Mitchell,	Pleasant Bay, Me.,	Having in possession and selling gull feathers,	Convicted,	Filed.	Forfeiture of feathers.
J. P. Squire, Sylvester L. Ricker, Manager,	Worcester,	Having seven partridge, close season,	Convicted,	Filed.	Paid costs of $40.
Eastern States Ref. Co.,	Springfield,	Having thirty-seven partridge and five woodcock, close season,	Convicted,	60 00	
Frederick H. Smith,	Somers, Conn.,	Owning two dogs that chased deer,	Convicted,	20 00	
Frank H. Hunt,	Baldwinsville,	Owning dog that chased deer,	Convicted,	20 00	
Leonidas Quentin,	Athol,	Hunting on Lord's Day; possession	Convicted,	20 00	Sunday hunting charge filed.
Joseph Bordeaux,	Athol,	of ferret,	Convicted,	Filed.	Payment of costs, $3.98.

Gates Wright,	Russell,	Owning dog that chased deer,	Convicted,	20 00		
Harry Witt,	North Dana,		Convicted,	20 00		
Nelson A. Bliss,	Millington,	Having four partridge, close season,	Discharged,	-		
Fred J. Baker,	Holyoke,		Convicted,	8 00		Ordered to remove sawdust.
Lucius S. Lawless,	New Salem,	Sawdust pollution,	Convicted,	10 00		Appealed.
John A. Carter,	Petersham,		Convicted,	5 00		Ordered to remove sawdust.
Bowen, Hadley & Co.,	Templeton,	Four short trout,	Convicted,	10 00		Filed three counts; fine on one.
Wm. Mongeau,	Chicopee Falls,	Feeding Sutton Pond (R. L., c. 91, § 23),	Convicted,	20 00		Paid costs of $7.
Monroe Cook,	Worcester,		Convicted,	-		Costs, $6; continued three months for sentence. No further action if pollution ceases.
Albert J. Baker,	Shutesbury,		Convicted,	Filed.		Costs, $2.28; promised to remove sawdust.
Frank Williams,	North Orange,	Sawdust pollution,	Convicted,	15 00		Appealed; fined $15.
Elisha P. Whitney,	Winchendon,		Convicted,	Filed.		Paid costs, $3.75.
Oliver L. Mann,	Winchendon,		Convicted,	Filed.		Paid costs, $3.75.
Nelson W. Wyman,	Winchendon,		Convicted,	Filed.		Paid costs, $3.75.
Wilder P. Clark,	Winchendon,		Convicted,	Filed.		Paid costs, $3.75.
Silas S. Richardson,	Montague,		Convicted,	Filed.		Paid costs, $3.65.
Joseph Brester,	Holyoke,	Fishing closed pond,	Convicted,	Filed.		
George Rupelle,	Worcester,	Fishing Sutton Pond,	Convicted,	10 00		
Oscar Wilson,	Worcester,		Convicted,	20 00		Appealed; fined $20.
John Brigham,	Worcester,	Fishing with trawls,	Convicted,	20 00		Appealed; not prossed.
Charles Julian,	Worcester,		Convicted,	20 00		Appealed; not prossed.
Roswell Allen,	Belchertown,	Killing partridge, close season,	Convicted,	Filed.		
Edward Barrows,	Westfield,	Buying and offering for sale three partridge,	Convicted,	20 00		Fined for one; two filed.
J. F. Smith,	Worcester,	Buying and offering for sale eight partridge,	Convicted,	20 00		Fined for one; two filed.
D. H. Stevens & Co.,	Springfield,	Having in his possession and offering for sale eight partridge,	Convicted,	100 00		
George C. Finch,	Thompsonville,	Taking live partridge out of State,	Convicted,	40 00		Fined for four; five filed.
George Jackson,	Springfield,	Having two partridge for sale,	Discharged,	-		
George A. Manter,	Plymouth,	Having eight short lobsters,	Discharged,	-		
Ansel P. Howes,	Dennis,	Short lobsters,	Convicted,	30 00		
Benjamin Walker,	Dennis,	Having three short lobsters,	Convicted,	12 00		
John L. Dixon,	Roxbury,	Having nine short lobsters; four falls,	Convicted,	9 00		
F. M. Stuart,	Woods Hole,	Fifty-eight short lobsters,	Convicted,	50 00		Served two months in jail; paid October 5.
Joseph Lang,	Gay Head,		Convicted,	100 00		Had permit for fish trap.
Freeman Ellis,	Brewster,	Setting fyke without license,	Discharged,	-		
Gideon E. Hall,	Brewster,		Convicted,	10 00		
Jeremiah P. Rich,	South Wellfleet,		Convicted,	10 00		
Edwin T. Cook,	Wellfleet,		Convicted,	10 00		

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Report upon Convictions, Fines, etc., for Violations of the Fish and Game Laws — Continued.

State v. —	Town or City.	Offence.	Court Decision.	Fine.	Remarks.
Fred Stetson,	Rockland,		Convicted,	$10 00	
John Hermson,	Rockland,		Convicted,	10 00	
George Williams,	Boston,		Convicted,	10 00	
Charles H. Kent,	Boston,	Hunting on Lord's Day,	Convicted,	10 00	
Sam Doe,	Boston,		Convicted,	10 00	
William Hatton,	Plymouth,		Convicted,	14 00	
Joshua Taylor,	Plymouth,		Convicted,	14 00	
John C. Beamish,	Plymouth,		Convicted,	14 00	
Edward Richarson,	Waltham,		Convicted,	2 00	These men paid costs of $3.10, or $1.03 each.
Herbert Brower,	Waltham,		Convicted,	2 00	
William Wilson,	Waltham,	Fishing in Wayland (R. L., c. 91, § 68),	Convicted,	2 00	
Marshall Bleas,	Saxonville,		Guilty,		Cases dismissed, to avoid giving the men a criminal record.
John Bleas,	Saxonville,		Guilty,	–	
Ernest Bleas,	Saxonville,		Guilty,		
George Moore,	Ayer,	Owning dog that chased deer,	Convicted,	20 00	Appealed; filed.
Carl Hoffman,	Ballardvale,	Fishing closed brook,	Convicted,	15 00	Paid costs of $3.
Frank W. Connell,	Westford,	Fishing tributary of closed pond,	Convicted,	5 00	
Edwin S. Brown,	Littleton,		Convicted,	5 00	
Fred Parker,	Nashua, N. H.,	Fishing closed pond,	Discharged,	–	Fishing was not in pond, as supposed.
Albert W. Thompson,	Waltham,	Hunting on Lord's Day,	Convicted,	10 00	
B. Amerult,	North Sudbury,	Hunting on Lord's Day; killing gray squirrel,	Convicted,	10 00	
Thomas Henry,	Wayland,	Hunting on Lord's Day,	Convicted,	Filed.	
Raphael Shiappia,	Ayer,	Hunting on Sunday, and without license,	Discharged,	–	
Cristis Farfarna,	Chelmsford,		Convicted,	10 00	
Thomas L. Casey,	Oakham,	Hunting on Lord's Day,	Convicted,	10 00	
Herbert D. Corey,	Bolton,	Shooting pheasant,	Discharged,	–	Claimed it was a hawk.
Willis C. Richardson,	Waltham,	Fishing, closed season,	Convicted,	10 00	
Edmond Mansfield,	Waltham,	Hunting on Lord's Day,	Convicted,	10 00	
John L. DeCarley,	Cheshire,	Owning dog that chased deer,	Convicted,	20 00	
H. D. & Frank Sisson,	New Marlborough,	Sawdust pollution,	Convicted,	30 00	Appealed; case in Supreme Court decided in favor of Commonwealth.
John W. Mahoney,	Greenfield,	Six short trout,	Convicted,	10 00	
David Gregg, Jr.,	Great Barrington,	Two short trout,	Convicted,	20 00	Appealed; fined $20; paid.
Andrew Lozzari,	Rowe,	Hunting without license,	Convicted,	20 00	
Frank Guiden,	Adams,	Shooting a bittern,	Convicted,	–	Filed at request of State agent.
Orcu Stone,	Adams,	Hunting on Lord's Day,	Convicted,	10 00	

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John Olson,	Manchester,	Hunting on Lord's Day; shooting sea fowl,	Convicted,	20 00		Bird-shooting charge filed.
Harry Brown,	Manchester,		Convicted,	20 00		Bird-shooting charge filed.
Pierre Senechal,	Taunton,	Fishing closed pond,	Convicted,	5 00		
Benjamin Tremblay,	Taunton,	Two short bass,	Convicted,	-		
Edward H. Williams,	Lynn,	Twenty-four short lobsters,	Convicted,	24 00		
Joseph S. West,	Manchester,	One hundred and twenty-eight short lobsters,	Convicted,	25 00		
Peter Knutson,	Gloucester,		Convicted,	10 00		
Edgar A. Cook,	Everett,	Hunting on Lord's Day,	Convicted,	10 00		
Alfred Swain,	Melrose,		Convicted,	10 00		
Chas. E. Thomas,	Boston,		Convicted,	10 00		
Charles N. Hutchins,	Reading,		Convicted,	10 00		
Charles R. Mackay,	Reading,		Convicted,	10 00		
Samuel W. Mackay,	Reading,		Convicted,	10 00		
Jude Ledger,	New Bedford,	Taking clams (R. L., c. 91, § 114),	Convicted,	10 00		
Simon P. Casey,	New Bedford,		Convicted,	10 00		
Peter Baldneau,	New Bedford,		Convicted,	10 00		
Alfred Demault,	New Bedford,	Offering partridge for sale in close season,	Filed.	10 00		
George H. Allson,	Lynn,		Convicted,	10 00		
Peter Gepson,	Lynn,	Hunting on Lord's Day,	Convicted,	10 00		On recommendation.
George Smith,	Lynn,		Filed.	-		
George Guleb,	Lynn,	Having short trout,	Convicted,	10 00		
B. C. Richardson,	Athol,		Filed.	-		
Edwin Walker,	Sturbridge,	Sawdust pollution,	Convicted,	10 00		Paid costs, $6.
E. E. Eames,	Paxton,		Filed.	-		Paid costs, $10.
Wesley Watson,	Moore's Corner,		Convicted,	10 00		Appealed; paid in Superior Court.
E. E. Eames,	Paxton,	Sawdust pollution; second offence,	Convicted,	25 00		Appealed; fined $25; paid.
William McDonald,	Boston,	Hunting on Lord's Day,	Filed.	-		
Jacob Reiff,	Belchertown,	Owning dog that chased deer,	Convicted,	20 00		Sentence suspended until September 8.
J. W. Williams,	Springfield,	Short trout,	Convicted,	10 00		
Elmer M. Thurber,	Hardwick,		Convicted,	30 00		
Clayton Adams,	Oakham,	Killing a deer,	Discharged,	-		
Robert E. Ezolds,	Holyoke,	Illegal fishing,	Convicted,	20 00		
Luigi Andres,	Braintree,		Discharged,	-		
Camillo Firman,	Braintree,	Hunting without license,	Discharged,	-		
Vincnzo Cardali,	Quincy,		Convicted,	10 00		
Walter Jackman,	Salisbury,		Convicted,	10 00		
Charles Reeves,	Salisbury,		Convicted,	10 00		
H. P. Berry,	Watertown,		Convicted,	20 00		
George F. Holmes,	Plymouth,	Hunting on Lord's Day,	Convicted,	10 00		Appealed.
James S. Clark,	Plymouth,		Convicted,	10 00		Appealed.
Augustus Fuller,	Brookline,		Discharged,	-		

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Report upon Convictions, Fines, etc., for Violations of the Fish and Game Laws — Continued.

State v. —	Town or City.	Offence.	Court Decision.	Fine.	Remarks.
William Green,	Dover,	Hunting with ferret; killing rabbit with ferret,	Convicted,	$40 00	
Henry C. Blake,	Holliston,	Hunting on Lord's Day; killing quail out of season,	Convicted,	30 00	
Charles A. Clark,	Sherborn,	Killing partridge out of season,	Convicted,	20 00	
Clarence H. Leonard,	Marshfield Hills,	Setting trap; possession of duck,	Convicted,	40 00	$20 on each charge; appealed.
Henry Mills,	Medway,	Having six short trout,	Convicted,	60 00	
C. L. Stevens,	Scituate,	Having four short lobsters,	Convicted,	10 00	Appealed.
John Stonefield,	Scituate,	Having five short lobsters,	Convicted,	25 00	Appealed.
Arthur E. Gunterson,	Scituate,	Having fourteen short lobsters,	Convicted,	70 00	Appealed.
Joe Batron,	Athol,	Ferreting; Sunday hunting,	Convicted,	Filed.	Paid costs.
George R. Stevens,	Westwood,	Short trout,	Convicted,	10 00	
Elizabeth Joseph,	Lawrence,		Convicted,	10 00	
Callan Devire,	Lawrence,		Convicted,	10 00	
Serne Ernest,	Lawrence,	Fishing Shawsheen River,	Convicted,	10 00	
Vanteenkist Arthur,	Lawrence,		Convicted,	10 00	
Charles Lafevore,	Lawrence,		Convicted,	10 00	
Vanbellingham Florimond,	Lawrence,		Convicted,	10 00	
Wilbur A. Parsons,	Easthampton,		Convicted,	5 00	
Raymond S. Parsons,	Easthampton,		Convicted,	5 00	
Myron J. Parsons,	Easthampton,	Spearing in Connecticut River,	Convicted,	5 00	
Edward C. Burpee,	Northampton,		Convicted,	5 00	
James F. Martin,	Northampton,		Convicted,	5 00	
Richard T. Ennis,	Northampton,		Convicted,	5 00	
Francisco Penter,	Concord,	Shooting song-birds,	Convicted,	20 00	
Frederic Nazarro,	Concord,		Convicted,	40 00	Appealed; paid $30 in Superior Court.
Earle N. Farrar,	Conway,	Hunting on Lord's Day,	Convicted,	10 00	
Robert H. Harte,	Conway,		Convicted,	10 00	
A. W. Frost,	So. Framingham,	Having three young woodcock,	Convicted,	30 00	
Henry Hughes,	Natick,	Hunting on Lord's Day,	Convicted,	10 00	
James Holbrook,	West Bridgewater,		Convicted,	10 00	
Edward Pittsley,	West Bridgewater,		Convicted,	10 00	
Charles Fanton,	West Bridgewater,		Convicted,	10 00	
William H. King,	Brockton,	Selling trout,	Convicted,	Filed.	
Stanley Biekwicz,	Andover,	Hunting without license,	Convicted,	10 00	
John Forage,	Andover,		Convicted,	10 00	
Keller Gorge,	Adams,	Shooting song-birds,	Convicted,	-	Paid costs, $3.98.
Andrew Mausun,	Adams,	Hunting without license,	-	-	Paid costs, $4.98; pleaded ignorance.

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C. A. Collins,	Milford,	Hunting on Lord's Day; one rabbit,	Convicted,	30 00	
George Frelas,	Somers, Conn.,	Owner of dog that killed deer,	Convicted,	20 00	
James J. Leary,	Boston,	Having game on Sunday,	Convicted,	Filed.	
William Walsh,	Boston,		Discharged,	-	
John Hanson, Jr.,	Cohasset,	Shooting from power boat,	Discharged,	-	
Edward Cole,	Cohasset,		Discharged,	-	
Ernest Griffin,	Annlequam,		Convicted,	Filed.	
A. H. Griffin,	Annlequam,		Convicted,	Filed.	
James Wheeler,	Annlequam,		Convicted,	Filed.	
Clarence Davis,	Annlequam,	Illegal fishing,	Convicted,	Filed.	
George Currier,	Annlequam,		Convicted,	Filed.	
Frank Butler,	Annlequam,		Convicted,	Filed.	
Frederick Long,	Annlequam,		Convicted,	Filed.	
Luigi Cefrillio,	Boston,	Hunting on Lord's Day; shooting song-birds,	Convicted,	$10 on each charge.	
Pazzi Cerolano,	Boston,	Hunting on Lord's Day; shooting song-birds; hunting without license,	Convicted,	30 00	$10 on each charge.
Salvatore Todario,	Boston,	Shooting song-birds; hunting with-	Convicted,	30 00	$10 on each charge.
Samuel Cicolo,	Boston,	out license,	Convicted,	30 00	$10 on each charge.
Frank LaCannara,	Boston,	Hunting without license,	Convicted,	10 00	
Ole N. Cole,	Westhampton,		Convicted,	10 00	
Albert E. Delson,	Westhampton,	Hunting on Lord's Day,	Discharged,	-	Minor.
Harold Thurston,	Everett,		Convicted,	10 00	
A. S. Marden,	Everett,	Song bird in possession,	Convicted,	10 00	
Theophile J. Smith,	Tiverton, R. I.,	Green heron in possession,	Convicted,	10 00	
Giovanni Parazzi,	Fall River,	Shooting song-bird; hunting without license,	Convicted,	Filed.	Paid costs of court.
James Denizio,	Providence, R. I.,	Hunting on Lord's Day; hunting	Convicted,	20 00	
John Venditti,	Providence, R. I.,	without license,	Convicted,	20 00	
Manuel Silva,	Swansea,	Hunting without license,	Convicted,	10 00	
Daniel Gracie,	Cohasset,		Discharged,	-	
Thomas Gracie,	Cohasset,	Hunting on Lord's Day; having	Discharged,	-	
George Mitchell,	Cohasset,	birds in possession,	Discharged,	-	
Angelo Mauhladell,	Gardner,	Hunting on Lord's Day; hunting without license,	Convicted,	25 00	Sunday charge filed.
Ernest Granelli,	Boston,	Shooting song-birds,	Convicted,	15 00	
Nicholas Sagonono,	Boston,		Convicted,	15 00	
Edward Kelly,	Randolph,	Hunting on Lord's Day,	Convicted,	10 00	
John F. Mahoney,	Randolph,		Convicted,	10 00	
Tony Palomlo,	East Cambridge,	Shooting song-birds,	Convicted,	10 00	
Antonio Antonelli,	Boston,		Discharged,	-	
Christos Fafaras,	South Chelmsford,	Hunting on Lord's Day,	Convicted,	10 00	
Napoleon J. Tremblay,	Pittsfield,	Fishing closed pond,	Convicted,	2 00	

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Report upon Convictions, Fines, etc., for Violations of the Fish and Game Laws — Concluded.

State v. —	Town or City.	Offence.	Court Decision.	Fine.	Remarks.
Phillip Mongen,	Ashley Falls,	Constructing and setting snares; hunting without license,	Convicted,	$30 00	$20 on first charge; $10 on second.
Mainette Oresti,	Lee,	Hunting without license; hunting on Lord's Day; having birds in possession,	Convicted,	35 00	$15, $10 and $10.
Tantera Martins,	Lee,		Convicted,	35 00	$15, $10 and $10.
Charles Kitner,	Westfield,	Hunting on Lord's Day,	Convicted,	Filed.	
A. H. Sherman,	Westfield,	Having short trout,	Convicted,	10 00	
Amiel Camyer,	Westfield,		Convicted,	10 00	
C. J. Loomis,	Westfield,		Convicted,	10 00	
William Rice,	Westfield,		Convicted,	10 00	
H. W. Charter,	Tariffville, Conn.,	Seining in great pond,	Convicted,	30 00	
E. A. Pond,	Tariffville, Conn.,		Convicted,	30 00	
Albert G. Taylor,	Tariffville, Conn.,		Convicted,	Filed.	A minor.
Arthur E. Mason,	Tariffville, Conn.,		Convicted,	30 00	
Mike Smith,	Northampton,	Setting nets in old bed, tributary to Connecticut River,	Convicted,	25 00	Committed.
Tony Wallace,	Northampton,		Convicted,	25 00	
Frank Onunskle,	Northampton,		Convicted,	25 00	
Gost Puccaini,	Springfield,	Hunting without license; shooting song-birds,	Convicted,	30 00	
Ottonio Bernarodi,	Springfield,		Convicted,	30 00	
Frank Vollinger,	Hatfield,	Hunting on Lord's Day,	Convicted,	10 00	
Peter Dopman,	Hatfield,	Hunting on Lord's Day; having partridge,	Convicted,	30 00	
Joseph L. Pierce,	Plymouth,	Hunting on Lord's Day,	Convicted,	15 00	
Charles Sanderson,	Plymouth,		Discharged,	-	
Robert McIntosh,	Jamaica Plain,		Convicted,	15 00	
John Simmons,	Duxbury,		Convicted,	15 00	
William Thomas,	Cambridge,		Convicted,	15 00	
Henry Jose,	Brookfield,		Convicted,	10 00	
Zoeth Sherman,	Yarmouth,	Setting fish trap,	Convicted,	10 00	

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[F.]

LEGISLATION.

Acts of 1905.

[CHAPTER 73.]

AN ACT TO EXTEND THE CLOSE SEASON ON PHEASANTS.

Be it enacted, etc., as follows:

SECTION 1. Section sixteen of chapter ninety-two of the Revised Laws is hereby amended by striking out in the first and second lines the words "thirteenth day of February in the year nineteen hundred and five", and inserting in place thereof the words: — open season for partridge and quail in the year nineteen hundred and seven, — so as to read as follows: — *Section 16.* Whoever, prior to the open season for partridge and quail in the year nineteen hundred and seven, takes, kills or has in possession, except for the purpose of propagation, a Mongolian, English or golden pheasant shall be punished by a fine of twenty dollars for each bird.

SECTION 2. This act shall take effect upon its passage. [*Approved February 14, 1905.*

[CHAPTER 81.]

AN ACT RELATIVE TO TAKING SHINERS FOR BAIT IN CERTAIN WATERS.

Be it enacted, etc., as follows:

SECTION 1. Section eighty-one of chapter ninety-one of the Revised Laws, as amended by section one of chapter one hundred and sixteen of the acts of the year nineteen hundred and four, is hereby further amended by inserting after the word "during", in the first line, the words: — October and, — by striking out the words "and December", in the first and second lines; and by inserting after the word "rivers", in the fourth line, the words: — and their tributaries, — so as to read as follows: — *Section 81.* During October and November any person may, for the purpose of taking shiners for bait, draw a net or seine at any point in the Merrimac and Connecticut rivers and their tributaries, except within four hundred yards of any fishway; and if any other fish so caught are immediately returned alive to the waters from which they were taken, the penalties prescribed in sections forty-six, forty-seven, forty-nine, seventy-eight and seventy-nine shall not apply to the taking of such fish.

SECTION 2. This act shall take effect upon its passage. [*Approved February 17, 1905.*

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[Chapter 122.]

AN ACT TO PROVIDE FURTHER FOR THE PROTECTION OF QUAIL ON THE ISLAND OF NANTUCKET.

Be it enacted, etc., as follows:

SECTION 1. It shall be unlawful to take, kill or have in possession any quail on the island of Nantucket at any time within three years after the first day of March in the year nineteen hundred and five.

SECTION 2. Whoever violates any provision of this act shall be punished by a fine of twenty dollars for every quail taken, killed or had in possession contrary to the provisions hereof. [*Approved, March 2, 1905.*

[Chapter 190.]

AN ACT RELATIVE TO THE TAKING AND SALE OF SMALL TROUT.

Be it enacted, etc., as follows:

Section sixty-four of chapter ninety-one of the Revised Laws, as amended by section eleven of chapter five hundred and forty-four of the acts of the year nineteen hundred and two, is hereby further amended by striking out the words "the county of Berkshire nor to", in the eighth line, so as to read as follows: — *Section 64.* Whoever at any time takes, catches or has in possession, or whoever sells or offers or exposes for sale in this Commonwealth, trout less than six inches in length shall forfeit ten dollars for each such trout taken, caught, held in possession, sold or offered or exposed for sale; but the provisions of this section shall not affect the provisions of section twenty-eight, nor shall they apply to a person who is engaged in breeding or rearing trout or to any person who, upon taking such trout, immediately returns it alive to the water from which it was taken. [*Approved March 17, 1905.*

[Chapter 245.]

AN ACT RELATIVE TO THE PROTECTION OF DEER FROM DOGS.

Be it enacted, etc., as follows:

Chapter ninety-two of the Revised Laws, as amended by section one of chapter one hundred and fifty-four of the acts of the year nineteen hundred and two, is hereby further amended by striking out section eighteen and inserting in place thereof the following: — *Section 18.* The owner or keeper of a dog found chasing or hunting deer at any time may be punished by a fine of not more than twenty dollars. Any of the commissioners on fisheries and game, or their deputies, or any member of the district police, or any officer qualified to serve criminal process, may kill a dog found chasing or hunting deer at any time if the dog is used for such purpose with the knowledge and consent of such owner or keeper, and the owner or keeper of such dog shall be punished by a fine of fifty dollars. If a dog has twice been found chasing or hunting

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deer, and if the owner or keeper of the dog has so been notified on each occasion by the commissioners on fisheries and game, it shall be a presumption of law, if the same dog is thereafter found chasing or hunting deer, that such chasing or hunting was with the knowledge and consent of the said owner or keeper, unless the contrary is shown by evidence. [*Approved March 30, 1905.*

[CHAPTER 273.]

AN ACT TO REGULATE THE SHOOTING OF WILD DUCKS AND GEESE IN CERTAIN WATERS OF THE COUNTY OF DUKES COUNTY.

Be it enacted, etc., as follows:

SECTION 1. It shall be unlawful in the county of Dukes County for any person to shoot or kill wild ducks or geese in any fresh water pond from a boat, raft or other device located at a greater distance than fifty yards from the shore.

SECTION 2. Any person violating any provision of this act shall be punished by a fine of not less than five nor more than two hundred and fifty dollars. [*Approved April 7, 1905.*

[CHAPTER 281.]

AN ACT RELATIVE TO THE TAKING OF MENHADEN FOR BAIT IN THE WATERS OF EDGARTOWN AND COTTAGE CITY.

Be it enacted, etc., as follows:

SECTION 1. Section one hundred and twenty-seven of chapter ninety-one of the Revised Laws is hereby amended by adding at the end thereof the words: — nor shall they prevent the inhabitants of said towns from taking menhaden for bait for their own use in the waters of their respective towns in the months of July, August, September and October, — so as to read as follows: — *Section 127.* Whoever sets or uses or aids in setting or using any seine, mesh net or gill net for the purpose of catching any other fish than mackerel, or by such means catches and retains any other fish than mackerel, in the waters of the towns of Edgartown and Cottage City within three miles from the shores thereof, may, upon view of the offence by any of the commissioners on fisheries and game or their deputies, or any officer qualified to serve criminal process or member of the district police, be arrested without warrant and prosecuted by him; and on conviction thereof shall be punished by a fine of not more than two hundred dollars, and, in the discretion of the court, shall forfeit to the Commonwealth all fish taken in said nets. The provisions of this section shall not affect the rights of any persons mentioned in section twenty-three or the corporate rights of any fishing company; nor shall they prevent the inhabitants of said towns from taking menhaden for bait for their own use in the waters of their respective towns in the months of July, August, September and October.

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SECTION 2. This act shall not restrict or affect the authority granted by chapter three hundred and one of the acts of the year nineteen hundred and four to the selectmen of the town of Edgartown to issue certain permits for the taking of bait.

SECTION 3. This act shall take effect upon its passage. [*Approved April 13, 1905.*

[CHAPTER 317.]

AN ACT TO PROVIDE FOR GRANTING TO UNNATURALIZED, FOREIGN BORN PERSONS LICENSES TO HUNT.

Be it enacted, etc., as follows:

SECTION 1. It shall be unlawful for any unnaturalized, foreign born person to hunt anywhere within the limits of the Commonwealth, unless he is licensed so to do as hereinafter provided.

SECTION 2. City and town clerks shall, upon the application of any unnaturalized, foreign born person who is a resident of the city or town in which the application is made, and upon the payment of a fee of fifteen dollars, issue to such person a license, upon a form to be supplied by the commissioners on fisheries and game, bearing the name, age and place of residence of the licensee, with a description of him, as near as may be, and authorizing the said licensee to hunt and to kill game on any lands in which such hunting or killing is not forbidden by law or by written or printed notices posted thereon by the owner, lessee or occupant thereof. Such license shall be good only for that period of the year when game may lawfully be killed, and shall authorize the hunting or killing of game only under such restrictions and for such purposes as are imposed or authorized by law. The said license shall not be transferable, and shall be exhibited upon demand to any of the commissioners on fisheries and game or their deputies, and to any game warden or deputy game warden, and to any sheriff, constable, police officer or other officer qualified to serve process. The fees received for the said licenses shall annually be paid into the treasury of the Commonwealth.

SECTION 3. A license granted hereunder shall be revoked by the city or town clerk issuing the same in case the licensee is convicted of a violation of the fish and game laws, or of hunting upon Sunday in violation of law.

SECTION 4. It shall be the duty of the commissioners on fisheries and game, upon request by any city or town clerk, to supply such clerk with license forms prepared in accordance with the provisions of this act.

SECTION 5. Whoever violates any provision of this act shall be punished by a fine of not less than ten nor more than fifty dollars. [*Approved April 21, 1905.*

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[CHAPTER 406.]

AN ACT RELATIVE TO THE CLOSE SEASON FOR QUAIL.

Be it enacted, etc., as follows:

Section three of chapter ninety-two of the Revised Laws, as amended by chapter one hundred and sixty-five of the acts of the year nineteen hundred and two, is hereby further amended by striking out the word "October", in the third line, and inserting in place thereof the word: — November, — and by adding at the end of the section the words: — *provided, however,* that any person, firm or corporation holding a permit from the commissioners on fisheries and game may sell or have in possession live quail for purposes of propagation within the Commonwealth, — so as to read as follows: — *Section 3.* Whoever takes, kills or has in possession, or buys, sells or offers for sale a quail, between the first day of December and the first day of November following, or, in the county of Bristol, between the fifteenth day of December and the first day of November following, whenever or wherever such bird may have been taken or killed, shall be punished by a fine of twenty dollars for each bird; but a person, firm or corporation dealing in game or engaged in the cold storage business may buy, sell or have in possession, and a person may buy from such person, firm or corporation, and have in possession if so bought, quail from the first day of December to the first day of May, except that, in the county of Bristol, this period shall be from the fifteenth day of December to the first day of May, if such quail were not taken or killed in this Commonwealth contrary to the provisions of this chapter; and a person, firm or corporation dealing in game or engaged in the cold storage business may have quail in possession on cold storage at any season, if such quail were not taken or killed in this Commonwealth contrary to the provisions of this chapter: *provided, however,* that any person, firm or corporation holding a permit from the commissioners on fisheries and game may sell or have in possession live quail for purposes of propagation within the Commonwealth. [*Approved May 17, 1905.*

[CHAPTER 407.]

AN ACT RELATIVE TO THE AUTHORITY OF THE COMMISSIONERS ON FISHERIES AND GAME.

Be it enacted, etc., as follows:

Section three of chapter ninety-one of the Revised Laws is hereby amended by inserting before the word "Each", in the first line, the words: — The commissioners are empowered to appoint deputies, and, — so as to read as follows: — *Section 3.* The commissioners are empowered to appoint deputies, and each of the commissioners, the deputies of the commissioners or members of the district police may enforce the laws regulating fisheries; and may seize and remove, summarily if need be, all illegal obstructions to the passage of migratory fish except dams, mills or machinery, at the expense of the persons using or maintaining the same. [*Approved May 17, 1905.*

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[CHAPTER 414.]

AN ACT RELATIVE TO SHORE, MARSH AND BEACH BIRDS.

Be it enacted, etc., as follows:

Section five of chapter ninety-two of the Revised Laws, as amended by chapter one hundred and sixty-two of the acts of the year nineteen hundred and three, is hereby further amended by striking out the word "or", in the fourth line, and inserting in place thereof the words: — a Bartramian sandpiper, also called upland plover, before the fifteenth day of July in the year nineteen hundred and ten, — and by inserting after the word "pigeon", in the fifth line, the words: — a Carolina or mourning dove, — so as to read as follows: — *Section 5.* Whoever takes or kills a plover, snipe, sandpiper, rail or any of the so-called shore, marsh or beach birds between the first day of March and the fifteenth day of July, a Bartramian sandpiper, also called upland plover, before the fifteenth day of July in the year nineteen hundred and ten, a wild or passenger pigeon, a Carolina or mourning dove, a gull or tern at any time, shall be punished by a fine of ten dollars for every bird so taken or killed; but the provisions of this section shall not apply to the great American herring gull nor to the great black-backed gull between the first day of November and the first day of May following. [*Approved May 17, 1905.*

[CHAPTER 417.]

AN ACT RELATIVE TO THE TAKING AND CATCHING OF PICKEREL.

Be it enacted, etc., as follows:

SECTION 1. A town may by a by-law duly enacted and approved as required by law forbid the taking or catching of pickerel in any river, stream or pond therein in any other manner than by naturally or artificially baited hook and hand line, and may provide a suitable penalty for the violation of such by-law.

SECTION 2. Section sixty-eight of chapter ninety-one of the Revised Laws, and chapter three hundred and sixty-four of the acts of the year nineteen hundred and four, are hereby repealed.

SECTION 3. This act shall take effect upon its passage. [*Approved May 18, 1905.*

[CHAPTER 419.]

AN ACT TO PROVIDE FOR THE PROTECTION OF DEER.

Be it enacted, etc., as follows:

Section seventeen of chapter ninety-two of the Revised Laws, as amended by chapter two hundred and forty-five of the acts of the year nineteen hundred and three, is hereby further amended by striking out the section and inserting in place thereof the following: — *Section 17.* Whoever, before the first day of November in the year nineteen hundred and eight, hunts, chases, wounds, injures or kills a deer, or sells

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or offers for sale or has in his possession for the purpose of sale, a deer captured or killed in Massachusetts, except his own tame deer kept on his own grounds, shall forfeit one hundred dollars for each offence: *provided, however,* that nothing contained herein shall prevent the owner or occupant of cultivated land from driving a deer therefrom; but dogs shall not be used for this purpose, nor shall the deer be wounded or injured. The possession of a deer killed in Massachusetts shall be prima facie evidence that the person having possession has violated some of the provisions of this section. [*Approved May 18, 1905.*

[CHAPTER 429.]

AN ACT RELATIVE TO FISHING FOR PICKEREL IN LAKE QUINSIGAMOND AND ITS TRIBUTARIES.

Be it enacted, etc., as follows:

SECTION 1. Section one of chapter one hundred and fifty-eight of the acts of the year nineteen hundred and one is hereby amended by inserting after the word "fish", in the second line, the words: — except for pickerel, — and by inserting after the word "fish", in the eleventh line, the words: — except pickerel, — so as to read as follows: — *Section 1.* For a period of five years after the passage of this act no person shall fish, except for pickerel, in any manner whatsoever between the first day of September and the first day of April in each year in Lake Quinsigamond in the county of Worcester, or in its tributaries, above what is known as the Stringer dam, including Full Moon cove, Jordan pond and Newton pond commonly called Mud pond; and between the first day of April and the first day of September in each year during said period no person shall take from said lake or its tributaries as aforesaid any fish, except pickerel, in any manner except with a single hook and either a hand line or a line attached to a rod or pole held by hand, with bait, artificial fly or spoon.

SECTION 2. Section two of said chapter is hereby amended by inserting after the word "fish", in the first line, the words: — except pickerel, — so as to read as follows: — *Section 2.* No person shall take any fish, except pickerel, from said lake or its tributaries as aforesaid during said period of five years for the purpose of sale, trade or barter. [*Approved May 22, 1905.*

Resolves of 1905.

[CHAPTER 12.]

RESOLVE TO AUTHORIZE THE COLLECTION OF STATISTICS IN REGARD TO DAMAGE CAUSED TO FOOD FISH BY PREDATORY FISH.

Whereas, there is pending in congress a bill to provide for the extermination of the dog-fish and other predatory fish; and

Whereas, to secure favorable action upon said bill, it is necessary that evidence of the damage caused by these fish be prepared and presented in proper form;

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Now, therefore, be it *Resolved*, That there be allowed and paid out of the treasury of the Commonwealth a sum not exceeding two thousand dollars, to be expended under the direction of the commissioners on fisheries and game, for the purpose of collecting, preparing and printing evidence and statistics in regard to the damage caused to the fishing industry of this state by dog-fish, so-called, and by other fish which prey upon food fish. [*Approved February 27, 1905.*

[CHAPTER 49.]

RESOLVE TO PROVIDE FOR AN INVESTIGATION AND REPORT BY THE COMMISSIONERS ON FISHERIES AND GAME AS TO SCALLOPS.

Resolved, That the commissioners on fisheries and game are hereby authorized and directed to investigate and report as to the time or times during each year when scallops propagate and as to the natural limit of their life, together with any other facts regarding scallops which the commissioners may think desirable to include in their investigation and report. Said commissioners may expend for the purposes of this resolve a sum not exceeding five hundred dollars. [*Approved April 13, 1905.*

[CHAPTER 54.]

RESOLVE TO AUTHORIZE AND DIRECT THE COMMISSIONERS ON FISHERIES AND GAME TO TAKE CONTROL OF THE POWDER HOLE, SO-CALLED, AT MONOMOY POINT, IN THE TOWN OF CHATHAM, FOR THE PROPAGATION OF LOBSTERS.

Resolved, That the commissioners on fisheries and game are hereby authorized to take full control of the Powder Hole, so-called, at Monomoy Point, in the town of Chatham, for the purpose of propagating lobsters, to clean out and screen said Powder Hole, and to prohibit fishing or the taking of fish therein, and to impound egg-bearing lobsters therein and to rear lobster fry. The manner of the taking of said Powder Hole and the determination of the damages sustained thereby, or by any of the doings of the commissioners under the provisions of this resolve, shall be the same as is provided by sections seven and eight of chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three relative to the taking of land by the metropolitan park commission; and said commissioners shall, for the purposes of this resolve, have all the powers conferred upon the metropolitan park commission by said sections. The damages when finally determined shall be paid from the treasury of the Commonwealth to the person or persons entitled thereto. A sum not exceeding one thousand dollars may be expended in carrying out the provisions of this resolve. [*Approved April 21, 1905.*

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[CHAPTER 73.]

RESOLVE TO PROVIDE FOR AN INVESTIGATION AND REPORT BY THE COMMISSIONERS ON FISHERIES AND GAME AS TO THE PROPAGATION OF OYSTERS.

Resolved, That the commissioners on fisheries and game are hereby authorized and directed to make a biological investigation and report as to the best methods, conditions and localities for the propagation of oysters under the conditions found in Massachusetts waters. The commissioners may expend for the purposes of this resolve a sum not exceeding five hundred dollars a year for a period of three years. [*Approved May 12, 1905.*

[CHAPTER 78.]

RESOLVE TO PROVIDE FOR AN INVESTIGATION AND REPORT BY THE COMMISSIONERS ON FISHERIES AND GAME AS TO THE PROPAGATION OF QUAHAUGS.

Resolved, That the commissioners on fisheries and game are hereby authorized and directed to make a biological investigation and report as to the best methods, conditions and localities for the propagation of quahaugs. The commissioners may expend for the purposes of this resolve a sum not exceeding five hundred dollars a year for a period of three years. [*Approved May 17, 1905.*

[CHAPTER 93.]

RESOLVE TO PROVIDE FOR A SURVEY BY THE COMMISSIONERS ON FISHERIES AND GAME OF AREAS AVAILABLE FOR THE PROPAGATION OF CLAMS.

Resolved, That the commissioners on fisheries and game are hereby authorized and directed to investigate and determine what areas or localities are, in their opinion, suitable and available for the propagation of clams, and to make a biological survey of such areas. Said commissioners may expend for the purposes of this resolve a sum not exceeding five hundred dollars a year for a period of three years. [*Approved May 24, 1905.*

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[G.]

Statistics.

The following tables show the statistics of the shore, net and lobster fisheries of Massachusetts as reported to the commission for the year ending Oct. 1, 1905.

The statistics are divided into three tables, specifying: (1) the number of men employed; (2) the number and value of boats, pound and trap nets, seines, gill nets and fyke nets, lobster pots and shore property; and (3) the number in pounds and value of the different species of fish. As compared with the year 1904, there is a falling off of 30 men, principally in Essex, Barnstable and Suffolk counties. The number of boats, seines, gill nets, and particularly lobster pots, show a falling off in number but a total increased value of over $8,000; and the total of 17,600,574 pounds of the different species of fish shows a decrease over 1904 of 750,639 pounds, with a decrease in value of $7,479.86.

Table No. 1. — *Showing, by Counties, the Number of Men employed in the Shore, Net and Lobster Fisheries of Massachusetts in 1905.*

Counties.	Number.	Counties.	Number.
Essex,	106	Nantucket,	30
Suffolk,	18	Dukes,	96
Norfolk,	16	Bristol,	78
Plymouth,	114	Total,	774
Barnstable,	316		

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TABLE NO. 2. — *Showing, by Counties, the Apparatus employed in the Shore, Net and Lobster Fisheries of Massachusetts in 1905.*

DESIGNATION.	ESSEX.		SUFFOLK.		NORFOLK.	
	Number.	Value.	Number.	Value.	Number.	Value.
Boats,	140	$20,814 00	34	$3,034 00	24	$3,571 00
Pound nets and trap nets,	5	7,800 00	-	-	-	-
Seines, gill nets and fyke nets,	172	5,119 00	-	-	-	-
Lobster pots,	2,700	2,895 75	1,960	2,362 50	1,713	2,114 00
Shore property and accessory apparatus,	-	2,030 30	-	160 00	-	298 75
Totals,	-	$38,659 05	-	$5,556 50	-	$5,983 75

DESIGNATION.	PLYMOUTH.		BARNSTABLE.		NANTUCKET.	
	Number.	Value.	Number.	Value.	Number.	Value.
Boats,	163	$11,907 50	173	$52,368 00	35	$8,574 50
Pound nets and trap nets,	3	3,300 00	92	82,085 00	3	3,000 00
Seines, gill nets and fyke nets,	4	35 00	1,135	8,122 00	276	4,580 00
Lobster pots,	4,705	6,924 00	1,383	1,376 25	230	230 00
Shore property and accessory apparatus,	-	2,511 00	-	15,463 25	-	830 00
Totals,	-	$24,677 50	-	$159,414 50	-	$17,214 50

DESIGNATION.	DUKES.		BRISTOL.		TOTALS.	
	Number.	Value.	Number.	Value.	Number.	Value.
Boats,	123	$12,895 00	33	$2,110 00	725	$115,274 00
Pound nets and trap nets,	44	20,200 00	1	40 00	148	116,425 00
Seines, gill nets and fyke nets,	3	68 00	16	1,380 00	1,606	19,304 00
Lobster pots,	938	1,144 50	200	225 00	13,829	17,272 00
Shore property and accessory apparatus,	-	1,471 25	-	1,687 50	-	24,452 05
Totals,	-	$35,778 75	-	$5,442 50	-	$292,727 05

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TABLE NO. 3.— *Showing, by Counties and Species, the Yield of the Shore Net and Lobster Fisheries of Massachusetts in 1905.*

SPECIES.	ESSEX.		SUFFOLK.		NORFOLK.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alewives,	70,165	$919 30	-	-	-	-
Bluefish,	468	31 30	-	-	-	-
Flounders and flatfish,	100	3 00	-	-	-	-
Mackerel,	56,344	3,455 03	-	-	-	-
Menhaden,	48,105	387 86	-	-	-	-
Pollock,	410,349	3,720 07	-	-	-	-
Salmon,	240	17 28	-	-	-	-
Scup,	1,647	69 76	-	-	-	-
Sea bass,	-	-	-	-	-	-
Sea herring,	1,167,689	12,866 93	-	-	-	-
Shad,	15,637	356 46	-	-	-	-
Squeteague,	59,708	1,916 65	-	-	-	-
Striped bass,	-	-	-	-	-	-
Squid,	40,355	429 30	-	-	-	-
Tautog,	305	15 15	-	-	-	-
Other edible or bait species,	911,873	9,443 66	-	-	-	-
Refuse fish,	-	-	-	-	-	-
Oil,	-	-	-	-	-	-
Lobsters,	128,757	17,264 99	76,785	$9,191 90	64,413	$9,136 28
Totals,	2,911,742	$50,896 74	76,785	$9,191 90	64,413	$9,136 28

SPECIES.	PLYMOUTH.		BARNSTABLE.		NANTUCKET.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alewives,	-	-	351,240	$5,724 67	4,000	$40 00
Bluefish,	-	-	8,860	539 90	22,135	1,908 94
Flounders and flatfish,	-	-	1,015,548	23,061 06	1,900	57 00
Mackerel,	4,011	$248 45	451,643	24,007 23	35,365	4,171 00
Menhaden,	-	-	92,900	909 46	-	-
Pollock,	-	-	2,867,210	21,811 04	246,890	4,937 80
Salmon,	-	-	-	-	-	-
Scup,	-	-	33,325	641 34	53,612	1,394 00
Sea bass,	-	-	592	40 42	-	-
Sea herring,	35,400	360 00	743,012	7,861 49	-	-
Shad,	-	-	63,753	1,926 57	5,950	418 00
Squeteague,	32,387	346 87	2,152,873	30,254 42	107,474	3,229 48
Striped bass,	-	-	3,497	479 86	-	-
Squid,	-	-	456,326	4,179 00	240	2 50
Tautog,	1,965	27 65	15,257	347 77	-	-
Other edible or bait species,	10,220	102 00	2,584,900	17,640 44	17,450	853 00
Refuse fish,	-	-	708,104	229 35	700	2 00
Oil,	-	-	-	-	-	-
Lobsters,	280,629	32,352 43	40,884	5,932 86	5,462	823 25
Totals,	364,612	$33,437 40	11,589,924	$145,586 88	501,178	$17,834 97

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TABLE 3. — *Yield of the Shore Net and Lobster Fisheries* — Concluded.

SPECIES.	DUKES.		BRISTOL.		TOTAL FOR STATE.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alewives,	18,200	$172 00	433,450	$4,925 17	877,055	$11,781 14
Bluefish,	485	42 95	–	–	31,948	2,521 09
Flounders and flatfish,	106,143	3,260 96	455	19 64	1,124,196	26,401 66
Mackerel,	13,087	999 10	–	–	560,450	32,880 81
Menhaden,	11,075	182 25	–	–	152,080	1,479 57
Pollock,	45,760	920 20	–	–	3,570,209	31,389 11
Salmon,	1,000	30 00	–	–	1,240	47 28
Scup,	622,159	12,918 62	216	6 48	710,959	15,030 20
Sea bass,	8,358	497 19	–	–	8,950	537 61
Sea herring,	100	1 00	5,000	50 00	1,951,201	21,139 42
Shad,	631	55 15	29,800	1,940 80	115,771	4,696 98
Squetcague,	1,221,993	38,676 22	200	10 00	3,574,635	74,433 64
Striped bass,	–	–	–	–	3,497	479 86
Squid,	17,100	223 00	–	–	514,021	4,833 80
Tautog,	7,970	253 26	2,560	101 20	28,057	745 03
Other edible or bait species,	130,354	656 32	6,504	381 76	3,661,301	29,077 18
Refuse fish,	6,200	4 00	–	–	715,004	235 35
Oil,	–	–	–	–	–	–
Lobsters,	32,459	4,750 80	5,319	836 45	639,708	80,288 96
Totals,	2,243,124	$68,643 02	483,504	$8,271 50	18,240,282	$337,998 69

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TABLE NO. 4.— *Comparison, Shore Weir and Net Fisheries, 1904 and 1905.*

SPECIES.	1904.		1905.		GAIN.		LOSS.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Alewives,	1,128,921	$9,548 10	877,055	$11,781 14	-	$2,233 04	251,866	-
Bluefish,	60,553	4,050 50	31,948	2,521 09	-	-	28,605	$1,529 41
Flounders and flatfish,	1,256,643	22,750 22	1,124,196	26,401 66	-	3,651 44	132,447	-
Mackerel,	754,454	46,978 38	560,450	32,880 81	-	-	194,004	14,097 57
Menhaden,	853,270	4,428 57	152,080	1,479 57	-	-	701,190	2,949 00
Pollock,	2,238,900	29,540 92	3,570,209	31,389 11	1,331,309	1,848 19	-	-
Salmon,	16	3 35	1,240	47 28	1,224	43 93	-	-
Scup,	631,867	14,338 99	710,959	15,030 20	79,092	691 21	-	-
Sea bass,	21,790	1,425 69	8,950	537 61	-	-	12,840	888 08
Sea herring,	1,884,123	15,861 63	1,951,201	21,139 42	67,078	5,277 79	-	-
Shad,	72,501	3,051 27	115,771	4,696 98	43,270	1,645 71	-	-
Squeteague,	3,017,786	64,419 29	3,574,635	74,433 64	556,849	10,014 35	-	-
Striped bass,	8,844	1,159 39	3,497	479 86	-	-	5,347	679 53
Squid,	813,839	7,978 41	514,021	4,833 80	-	-	299,818	3,144 61
Tautog,	15,428	312 50	28,057	745 03	12,629	432 53	-	-
Other edible or bait species,	5,435,122	39,020 88	3,661,301	29,077 18	-	-	1,773,821	9,943 70
Refuse fish,	17,800	10 25	715,004	235 35	697,204	225 10	-	-
Oil,	5,200	311 25	-	-	-	-	5,200	311 25
Totals,	18,217,057	$265,189 59	17,600,574	$257,709 73	2,788,655	$26,063 29	3,405,138	$33,543 15
Net gain,	-	-	-	-	-	-	-	-
Net loss,	-	-	-	-	-	-	616,483	7,479 86

NOTE.— Had the remarkable catch of cod at Provincetown, Chatham, Nantucket and other points from October 15 to December 31 been included, a very considerable increase over the 1904 figures would have been shown.

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TABLE No. 5. — *Comparison, 1904 and 1905, Shore Wear and Net Fisheries, Men and Apparatus.*

	1904.		1905.	Gain.		Loss.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Men,	478	-	490	-	12	-	-	-
Boats,	388	$66,404 00	310	$77,594 50	-	$11,190 50	88	-
Pounds and traps,	161	106,145 00	148	116,425 00	-	10,280 00	13	-
Seines, fyke and gill nets,	1,897	24,401 00	1,606	19,304 00	-	-	291	$5,097 00
Shore property and accessory apparatus,	-	18,730 70	-	20,012 25	-	1,281 55	-	-

TABLE No. 6. — *Comparison of Lobster Catch, 1904 and 1905.*

1904.			1905.			Gain.			Loss.		
Pots.	Lobsters.	Value.	Pots.	Lobsters.	Value.	Pots.	Lobsters.	Value.	Pots.	Lobsters.	Value.
19,839	552,290	$102,354 53	13,829	426,471	$80,288 96	-	-	-	5,710	125,819	$22,065 57

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TABLE NO. 7. — *Average Catch of Lobsters per Pot, 1904 and 1905.*

1904.			1905.		
Pots.	Lobsters.	Average per Pot.	Pots.	Lobsters.	Average per Pot.
19,539	552,290	28.3	13,829	426,471	30.8

TABLE NO. 8. — *Comparison of Lobster Fishery for State, 1904 and 1905, Men and Apparatus.*

	1904.		1905.		GAIN.		LOSS.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Men,	326	-	284	-	-	-	42	-
Boats,	471	$41,573 00	415	$37,679 50	-	-	56	$3,893 50
Pots,	19,539	23,648 00	13,829	17,272 00	-	-	5,710	6,376 00
Shore property,	-	4,918 15	-	4,439 80	-	-	-	478 35

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PUBLIC DOCUMENT . . . . . No. 42.

FOURTEENTH ANNUAL REPORT

OF

THE COMMISSIONERS

OF THE

MASSACHUSETTS NAUTICAL TRAINING SCHOOL.

JANUARY 1, 1906.



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CONTENTS.

	PAGE
The Work of the Year,	7
The Summer Cruise,	7
A Second Gold Medal awarded,	11
The Winter Term,	12
Winter Lectures,	12
Visiting the "Enterprise,"	12
Personnel,	13
Information regarding Graduates of the School,	13
Summary,	16
Graduating Classes,	18
Statistics of Cadets,	21
Appropriations,	23
Legal Authority for the School,	24
Recent Legislation,	27

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COMMISSIONERS

OF THE

MASSACHUSETTS NAUTICAL TRAINING SCHOOL.

N. M. DYER, *Chairman*,
REAR ADMIRAL, U. S. N. (RETIRED).
ROBERT B. DIXON, M.D.
HON. JOHN READ, LATE U. S. N.

F. STANHOPE HILL, *Secretary*.

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Commonwealth of Massachusetts.

MASSACHUSETTS NAUTICAL TRAINING SCHOOL.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts in General Court assembled.

The Commissioners of the Massachusetts Nautical Training School have the honor to submit their report of the operations of the school for the year 1905.

The Work of the Year.

During the past year the work of the Nautical Training School has been satisfactorily carried on, with an average of 81 cadets on the roster from Jan. 1, 1905, to Dec. 31, 1905. Twelve cadets graduated in April, — 5 in the engineer class and 7 in the seamanship class; and in October the graduating class numbered 8, — 5 in the seamanship class and 3 in the engineer class; making a total for the year of 20 graduates, — 10 engineers and 10 seamen.

The Summer Cruise.

The nautical training ship "Enterprise" sailed from Boston on her usual summer cruise May 25, with a complement of 89 cadets on board. It was decided by the Commissioners that the first part of the four months usually devoted to this cruise should be passed in home waters, with a view of affording a better opportunity for exercise in boat work and preliminary training than could be obtained on deep water.

To this end the ship remained in Provincetown and in Long Island Sound until July 3, when she sailed for Horta, Island of Fayal. During the cruise the ship visited Queenstown, Ireland, Gibraltar and Madeira, returning to Provincetown September 26, and to Boston September 29.

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In the accompanying abstracts from the report to the commissioners of the superintendent, Commander William F. Low, U. S. Navy, an idea will be obtained of the incidents of the cruise and of the work and conduct of the cadets during that period.

Itinerary.

Left.	Date.	Arrived.	Date.
New London, Conn.,	July 3.	Horta, Fayal,	July 20.
Horta, Fayal,	July 24.	Queenstown, Ireland,	Aug. 2.
Queenstown, Ireland,	Aug. 10.	Gibraltar,	Aug. 20.
Gibraltar,	Aug. 24.	Funchal, Madeira,	Aug. 29.
Funchal, Madeira,	Sept. 2.	Provincetown, Mass,	Sept. 26.
Provincetown, Mass.,	Sept. 28.	Boston, Mass.,	Sept. 29.

During the cruise the time of the cadets was as well taken up in general and special exercises and instructions as the weather and other circumstances would admit. Persistent calms and light airs prevailed almost the entire cruise after leaving New London, with the exception of that time spent in the trade wind regions on the homeward passage, where the trades were found constant and steady.

The health of the cadets has been good. The behavior of the boys, both afloat and ashore, has been excellent, and has brought forth much commendation.

The new blower which was installed on the gun deck has worked satisfactorily, and has been of material benefit in ventilating the forward berth deck and fire room. This blower will be installed as a permanent fixture.

The coal consumption for the cruise was 444 tons, 186 pounds, as follows: —

	Tons.	Pounds.
For steaming,	288	462
For distilling and lighting,	140	1,926
For banking and starting fires,	12	798
For steam launch,	2	1,480
	444	186

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The cadets were instructed as follows: —

Seamanship.

Setting up rigging; reeving off gear; bending sail; sail making; steering; heaving lead and log; under oars; duties as coxswains of boats; captains of tops; quartermasters and officers of the deck; bracing; making and taking in sail; running lines; mooring and unmooring; handling yards; shifting and reefing sail; heaving to under storm sail; lookouts; securing boats for sea.

Navigation.

A. — The two senior classes: dead reckoning; course and distance by middle latitude and Mercator's sailing; taking departure; setting courses; correcting courses; taking bearings; plotting position; latitude by meridian; circum-meridian and ex-meridian altitudes of the sun and other heavenly bodies and by pole star; time sights and longitude by sun or other heavenly body; Sumner's method by projection and calculation; observing azimuth and finding compass error; finding chronometer errors and rates; care and handling of chronometers; comparing chronometers; finding time of high water at places; use of charts of all kinds; sailing directions; tide tables; light lists and other aids to navigation; use and adjustment of instruments; danger angle; how to identify the stars; compensating compasses and barometers; practical work with artificial horizon on shore.

B. — The third class was given the same instruction as the two senior classes, but preference was always given the seniors in the more advanced practical work.

C. — The junior cadets were instructed in boxing the compass and the elements of dead reckoning.

D. — Each watch of the three senior classes found the position every alternate day by dead reckoning and observation of the sun, and worked observations of the stars morning and evening, when the weather was favorable.

Engineering.

First Part.

A. — Steam and water piping; firing; the care and repair of pumps; care of engines; oiling; packing of joints; adjusting valves; lining up engines; care of evaporators; general duties required in the engine room.

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Second Part.

B. — Firing; water tending; running electric light engine and dynamo; care of pumps and their repair; distilling; care of evaporators and general fire room duties.

Junior Cadets.

C. — Coal passing; firing; cleaning boilers; instruction in the lead and use of pipes, check and other valves, and the names and uses of boiler attachments.

MEDICAL DEPARTMENT.

Course of instruction in first aid to injured, including how to act in presence of emergency; the use of disinfectants; symptoms and treatment of burns, bruises, hemorrhage, wounds, sprains, fractures, dislocations, foreign bodies in eye, ear and throat, unconsciousness, fainting, shocks, compression, sunstroke, starving, drunkenness, convulsions, smothering by gas, hanging, drowning, poison, dog, snake or insect bites, and poison ivy; making of dressings and poultices.

The accompanying report, while showing very satisfactory results for a four months' cruise, does not, of course, show the increase in muscular tone, which is very marked. This is especially true in the cases of many of the cadets who entered at the beginning of the summer term, whose muscles at that time were soft and flabby, and at the end of the cruise are well developed and firm. It may safely be said this year that there is no cadet on board who has not benefited physically.

	June 9, 1905.	Sept. 28, 1905.	Gain.
Weight,	131.8 lbs.	134.66 lbs.	2.86 lbs.
Height,	5 ft. 6.6 in.	5 ft. 7 in.	.4 in.
Chest,	32.5 in.	32.75 in.	.25 in.
Chest expansion,	3 in.	3.375 in.	.375 in.
Arm flexed,	12 in.	12.125 in.	.125 in.
Girth at umbilicus,	29.375 in.	29.875 in.	.5 in.
Leg,	13.5 in.	13.75 in.	.25 in.

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Commissary Report.

The commissary report is as follows: —

Sea stores procured in Boston,		$4,071 24
Stores purchased on cruise,		1,757 98
		$5,829 22
Less stores on hand September 30,	$456 65	
Less stores condemned and lost,	119 46	
Less ice and freight charges,	39 07	
		615 18
Cost of stores consumed,		$5,214 04
Number of ration days (83 cadets, 35 men),		15,222
Cost per ration day,		$0 342

The classified expenditures on the cruise were as follows: —

Pay roll,		$4,573 59
Rations commuted to officers,		396 00
Commissary,		1,757 98
Coal,		1,882 63
Water,		82 91
Equipment department,		92 37
Engineering department,		249 56
Pilotage,		57 51
Garbage,		19 48
Contingent,		329 38
		$9,441 41
Coal on hand, arrival at Boston,	$188 55	
Commissary stores on hand,	456 65	
Stores condemned and lost,	119 46	
		764 66
Net cost of cruise,		$8,676 75

A Second Gold Medal awarded.

As noted in the annual report of 1904, a gold medal was awarded the exhibit of the work of this school at the Louisiana Purchase Exposition at St. Louis. At the close of that exhibition the commissioners received a request from the managers of the Lewis and Clark Exposition at Portland, Ore., that the exhibit of the Massachusetts Nautical Training School be shipped to Portland as a part of the Massachusetts educational exhibit. This request was cheerfully complied with, and the commissioners have lately been informed by Mr. Wilson H. Fairbank, executive commissioner for Massachusetts, that this

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school has been awarded a gold medal for the excellence of its exhibit, presented through the medium of about forty large photographs, ingeniously mounted and hinged in a standing cabinet, with several views of the "Enterprise," the officers and instructors, and the cadets engaged in practical work in the different departments of the school, as also specimens of their work in theoretical seamanship and navigation.

The Massachusetts Board of Managers have also added, as a souvenir to those receiving a gold medal, a handsome silk banner, which has been presented to this commission, "with their compliments, and with thanks for the splendid exhibit prepared and entrusted to their care."

The Winter Term.

By the continued courtesy of the Bath Commissioners of the City of Boston, the "Enterprise" is moored at the wharf of the North End Park, Boston, free of expense to the Commonwealth. As usual, the ship has been housed over, thus affording comfortable quarters for instructing the cadets during the winter term.

Winter Lectures.

The series of lectures inaugurated last year for the cadets proving so successful, the commissioners decided to arrange for a course for the winter of 1905–06.

The course was opened on December 7 with an entertaining lecture by Mr. J. L. Harbour, upon "Wit and Humor." The lectures to follow are one on January 11 by Prof. William H. Davis of Harvard University, the subject being "The Colorado Cañons," with numerous illustrations; one on January 25 by Mr. V. Stefanson, on "Iceland;" and one on February 8 by Commissioner John Read, upon "The Old Navy and the New," illustrated by a large number of stereopticon views. One additional lecture has not yet been fully arranged for.

Visiting the "Enterprise."

Should any members of the Legislature desire to obtain further knowledge of the operations of the school by personal observation, the commissioners and the superintendent would

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be gratified to have them visit the "Enterprise" at the North End Park on any day excepting Saturday and Sunday, when the cadets are absent on home leave.

Personnel.

The changes in the officers and instructors during the year have been as follows: —

April 10, 1905, Ensign Creighton Churchill, U. S. N. (retired), was ordered by the Navy Department to the "Enterprise" as executive officer, *vice* Ensign William L. Varnum, U. S. N., detached.

April 20, 1905, Boatswain H. R. Brayton, U. S. N. (retired), was ordered by the Navy Department to the "Enterprise" for duty as watch officer and instructor.

May 30, 1905, the resignation of Chief Engineer Robert Crawford, passed assistant engineer, U. S. N. (retired), was accepted.

June 1, 1905, Frederic M. Ball was appointed as chief engineer for the summer cruise.

May 5, 1905, Mr. Joseph E. Gately's temporary appointment as ensign and assistant instructor expired.

Nov. 1, 1905, Assistant Engineer Robert E. Carney, U. S. N. (retired), was ordered by the Navy Department to the "Enterprise" as chief engineer.

Nov. 1, 1905, Chief Engineer Frederic M. Ball's resignation was accepted.

Information regarding Graduates of the School.

An earnest effort is made by the commissioners to keep a record of the employment of the graduates of this school, the information being obtained mainly by circular letters sent to their parents at regular intervals. From the replies received it is evident that the object of the school is being largely attained in furnishing trained and competent men for deck and engine room service in the merchant marine. It is also noted that vessel owners and captains display a willingness to promote our graduates to positions of responsibility and increased emolument as the young men prove their fitness for such advancement. The commissioners have been pleased to receive

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from parents many words of commendation of the work of the school.

Considering the present condition of American shipping, it is not surprising that a large number of the graduates obtain places on board coastwise steamers or on vessels belonging to the United States government, while a small per cent. find employment on board vessels in the foreign trade. This must of necessity be the case so long as our ocean-going tonnage remains at its present low ebb.

Three cadets who graduated with high marks have been appointed watch officers and instructors on board the nautical training ship "Enterprise," one of whom has been navigating officer for the past three years.

Last June Mr. John F. McGourty of Worcester passed the required examination, and was given an appointment as cadet in the U. S. revenue cutter service. This makes five graduates of the school who are in that service, four of them commissioned as lieutenants.

Two graduates of the school were in one of the most memorable maritime events of this winter, one as rescuer and the other as one of the thirteen persons saved from the perils of the sea. In response to a request by wireless telegraphy for assistance, the U. S. light house tender "Azalea," whose first officer is Mr. George E. Eaton, a graduate from this school in 1895, left New Bedford December 10 for Nantucket Shoals, to rescue the crew of the relief lightship No. 58, which had sprung a leak during a severe storm, and was in danger of foundering. An attempt was made to save the lightship by towing her to New Bedford, but after proceeding about twenty miles she filled and sank. The members of her crew, including graduate John E. Luby, the assistant engineer, were taken on board the "Azalea."

A graduate who has served in the naval collier service for three years is now third assistant engineer on board the auxiliary "Cæsar," one of the colliers engaged in the work of towing the immense dry dock "Dewey" from Chesapeake Bay to the Philippines.

The unique and disastrous experience of being captured by the war vessels of two foreign powers also came to Harold C. Rideout, a recent graduate. During the progress of the Russo-

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Japanese war, while on board a large tramp steamer bound from Calcutta to Kobe, Japan, his ship was captured in the Sea of Japan by the Russian cruiser "Odessa," and after two weeks he was landed at Shanghai. While later sailing in the same vessel from Seattle to Vladivostock, he was captured by a Japanese cruiser and taken to Kobe. Thence he went in his ship seven hundred miles up the Yang-tse-Kiang River, where tea was loaded for Odessa.

A cadet who graduated in April last accepted a position on the steamship "Philadelphia" of the American line. On the second trip he was made quartermaster, and on the third voyage he was promoted to senior quartermaster.

James S. Howes of Woods Hole, who graduated from the school Oct. 15, 1900, is said to be the youngest first mate in the employ of the Boston & Philadelphia Steamship Company.

One graduate was for a time acting chief engineer of the U. S. revenue cutter "Rush," at Juneau, Alaska. He has been in the revenue cutter service for three years as assistant engineer.

Recent graduates of the school have reported that they were employed as follows: —

Quartermaster, steamship "Caracas," New York & Porto Rico Steamship Company; electrician, Eastern Steamship Company; assistant engineer, U. S. naval collier "Cæsar;" first assistant engineer, steamship "J. N. Guffy;" second mate, steamship "Ligonier;" quartermaster, steamship "Indian," Boston & Philadelphia Steamship Company; oiler, steamship "Herman Winter," Metropolitan line; steamship "Mexico," Ward line; quartermaster, naval collier "Abarenda;" quartermaster, U. S. lighthouse tender "Mayflower;" electrician, U. S. steamship "Illinois;" oiler, steamer of the New York & Porto Rico line; senior quartermaster, steamship "Philadelphia," American line; oiler, steamer of the Morgan line; oiler, steamship "Admiral Dewey;" machinist, U. S. Navy; fireman, towboat "Nathaniel Sutton;" quartermaster, American line.

While every young man should be impressed at the beginning of his career with the fact that achievement and advancement must be due entirely to his own efforts, yet the commissioners have been glad to do what they could to secure for

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graduates desirable positions at sea. To this end they mailed a circular letter last September to a number of vessel owners and agents, from which the following extracts are given : —

The Massachusetts Nautical Training School graduates in October and April of each year a varying number of young men in the engineering and seamanship classes, fitted to accept subordinate positions in the engine room and on the deck of steamers and sailing ships of our mercantile marine.

These young men pass through a two years' course of instruction in navigation, practical seamanship, marine engineering and electricity (so far as pertains to electric lighting and small motors), and make two ocean cruises of four months each on board the schoolship "Enterprise," for practical work.

The commissioners will be pleased to give you any information in regard to them which you may desire, and meanwhile send with this pamphlets giving full information concerning our school and its graduates.

SUMMARY.

The following tables show the different capacities at sea or in engineering duties on shore in which the cadets have been employed since leaving the school, and also the branches of service in which they have been engaged, so far as known by the commissioners : —

Seaman Class.		Engineer Class.	
Masters,	6	Chief engineers,	9
First officers,	11	First assistant engineers,	3
Second officers,	29	Second assistant engineers,	12
Third officers,	13	Third assistant engineers,	10
Fourth officers,	3	Fourth assistant engineers,	2
Chief quartermasters,	4	Engineers and assistant engineers,	44
Quartermasters,	74	Engineer cadets and oilers,	58
Cadets and seamen,	55	Firemen,	10
Boatswains,	2	Chief machinist,	1
Chief yeomen,	4	Machinists,	28
Acting ensigns, U. S. N.,	3	Machinists and warrant machinists, U. S. N.,	9
Third lieutenants, revenue cutter service,	4	Chief electrician,	1
Cadet, revenue cutter service,	1	Electricians, U. S. N.,	9
Boat keepers, pilot boat service,	5	Electricians,	50
Total,	214	Total,	246
Grand total,	460		

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Class of Vessels.

Transatlantic steamers,	85
Coastwise steamers,	96
Pacific steamers,	20
"Tramp" steamers and towboats,	18
Steam yachts,	22
Sailing vessels,	33
Pilot boats,	5
United States naval vessels,	71
United States naval colliers,	23
United States transports,	16
United States revenue cutter steamers,	13
United States coast survey steamers,	8
United States lighthouse steamers,	8
At sea,	418

Cadets admitted, graduated and honorably discharged, from 1893 to 1905, Inclusive.

	Admitted.			Graduated.			Honorably Discharged.		
	Seamanship Class.	Engineer Class.	Totals.	Seamanship Class.	Engineer Class.	Totals.	Seamanship Class.	Engineer Class.	Totals.
1893,	138	–	138	–	–	–	29	–	29
1894,	42	21	63	–	–	–	26	17	43
1895,	33	38	71	19	19	38	6	6	12
1896,	35	39	74	20	17	37	16	15	31
1897,	32	41	73	20	21	41	10	10	20
1898,	42	57	99	15	25	40	12	14	26
1899,	34	45	79	11	12	23	24	17	41
1900,	28	50	78	14	36	50	9	12	21
1901,	34	37	71	11	18	29	8	12	20
1902,	32	58	90	16	22	38	16	18	34
1903,	34	32	66	17	14	31	10	15	25
1904,*	–	–	60	16	29	45	5	12	17
1905,*	–	–	65	10	10	20	–	–	9
Totals,	–	–	1,027	169	223	392	–	–	328

* Beginning in 1904, the cadets upon entrance are unclassified until their second year.

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Membership of the School, Graduates for 1905, 1906 and 1907.

Spring Graduating Class, April 13, 1905.

Anthony, L. J.,	Taunton.
Barrows, R. L.,	Boston.
Cady, F. M.,	Lowell.
Chisholm, T. W.,	North Billerica.
Clark, H. R.,	Middleborough.
Gridley, H. H.,	Dorchester.
Gervais, A. A.,	Westborough.
Kelley, L. G.,	Taunton.
Kinnaly, J. F.,	South Boston.
Lockhart, W. C.,	Wakefield.
Morin, Eugene,	Hyde Park.
Tarr, C. F.,	Taunton.

Fall Graduating Class, Sept. 30, 1905.

Burdekin, R. W.,	South Framingham.
Crocker, J. A.,	Nahant.
Carlton, F. G.,	Maynard.
Maynard, H. W.,	Winthrop.
Mullaly, C. C.,	Dorchester.
Newhall, W. C. F.,	Lynnfield.
O'Brien, E. R.,	West Roxbury.
Walker, F. S.,	Roxbury.

Class to graduate April, 1906.

Booth, F. A.,	New Bedford.
Butler, L. B.,	Worcester.
Caldwell, A. C.,	Dorchester.
Cushman, C. E., Jr.,	Rockport.
Copeland, H. G.,	Malden.
Dolan, W. R.,	Worcester.
Flannigan, E. J.,	Wakefield.
Graves, Herbert,	Wilmington.
Houghton, L. H.,	Worcester.
Howard, A. M.,	Chelmsford.
Hanes, C. W.,	Melrose.
Holbrook, C. A.,	Marlborough.
MacDonald, W. R.,	Neponset.
McDonald, C. B.,	Springfield.
McKey, R. H.,	Dorchester.
Morgan, C. L.,	Beverly.
Peckham, H. I.,	Marlborough.
Roach, H. C.,	New Bedford.
Ruyter, John,	Stoughton.
Sheedy, J. C.,	Malden.
Towle, W. F.,	Mansfield.

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Class to graduate October, 1906.

Batchelder, L. K.,	Melrose.
Bates, P. S.,	Southville.
Brown, W. H.,	Boston.
Bosson, G. C.,	Reading.
Burbank, A. G.,	Carver.
Colony, C. E.,	Brookline.
Doherty, M. J.,	Winthrop.
Emmerton, D. S.,	Peabody.
Foster, V. M.,	East Boston.
Gladding, B. N. A.,	New Bedford.
Hunt, T. F.,	Lynn.
Jones, L. A.,	Middleborough.
Lee, W. H.,	Roxbury.
Nutting, C. E.,	Cambridge.
Stott, W. J.,	Worcester.
Wilmarth, F. C.,	Saundersville.
Webster, W. R.,	Worcester.

Class to graduate April, 1907.

Baxter, Thomas,	South Dennis.
Chick, H. L.,	Beverly.
Coughlan, F. M.,	North Dartmouth.
Chaney, E. E.,	Arlington Heights.
Doll, G. O.,	East Boston.
Early, R. V.,	Newton Lower Falls.
Gerrard, R. T.,	Springfield.
Garity, Herbert,	Charlestown.
La Montague, L. L.,	Miller's Falls.
Lewis, D. C. C.,	New Bedford.
Lunt, W. H.,	Groveland.
Matthews, W. E.,	Worcester.
Merriam, P. W.,	Greenfield.
McDonald, C. E.,	Dorchester.
McDonald, C. S.,	Malden.
Parker, G. L.,	Reading.
Perley, A. E.,	Wakefield.
Perley, J. A.,	Lynnfield.
Smith, Norman,	Andover.
Smith, W. L.,	Ashburnham.
Stone, C. L.,	Melrose Highlands.
Small, E. B.,	North Truro.
Smith, P. R.,	Concord.
Stephenson, R. R.,	East Whitman.
Sherman, G. S.,	Jamaica Plain.
Saville, L. B.,	Lexington.
Sharp, W. D.,	Lanesville.
Stickney, G. H.,	Worcester.
Thurston, J. C., Jr.,	Grafton.

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Whitney, L. G.,	Dorchester.
Wilder, H. P.,	Marlborough.
Wier, J. R.,	Saundersville.
Walker, L. A.,	Whitman.

Class to graduate October, 1907.

Biathrow, C. A.,	Malden.
Bragg, A. E.,	Woods Hole.
Carr, A. L.,	Concord Junction.
Colby, W. H.,	Melrose.
Damon, P. L.,	West Hanover.
Green, H. D.,	Duxbury.
Gifford, W. M.,	Woods Hole.
Hazelton, C. I.,	Amesbury.
Hartwell, C. E.,	Worcester.
Johnson, W. F.,	Auburndale.
King, C. F.,	North Adams.
King, R. R.,	Springfield.
McMillan, W. E. R.,	Pittsfield.
Marcy, P. B.,	Boston.
March, R. I.,	Haverhill.
Osgood, S. P.,	Middleborough.
Reilly, J. J.,	Dorchester.
Robinson, M. H.,	Haverhill.
Southwick, L. W.,	Peabody.
Sears, F. L.,	East Dennis.
Simonds, C. W.,	Charlestown.
Ware, S. H.,	Peabody.
West, R. C.,	Wakefield.
Youngs, S. G.,	Brookline.

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Statistics of Cadets.

Cadets admitted during the Year 1905.

Number in the school Jan. 1, 1905: —			
Seamanship class,		14	
Engineer class,		12	
Nautical cadets,		46	
Total,			72
Applications received, 1905,		92	
Failing to appear for examination,	15		
Unsatisfactory recommendations,	4		
Applicants examined,	73		
Examined,		73	
Failed to pass mental examination,	20		
Failed to pass physical examination,	3		
Failed to pass mental and physical examinations,	5		
Passed examinations,	45		
Passed examinations,	45		
Re-examined mentally and passed,	16		
Re-examined physically and passed,	2		
Re-examined mentally and physically and passed,	2		
Readmitted,	1		
	66		
Failed to qualify after passing examinations,	1		
	65		
Total number admitted to school during 1905,			65
Total number connected with the school during 1905,			137

Cadets withdrawn during the Year 1905.

Total number regularly graduated,		20	
Seamanship class,	10		
Engineer class,	10		
Total number honorably discharged,		9	
Seamanship class,	2		
Engineer class,	3		
Nautical cadets,	4		
Total number graduated and honorably discharged,		29	
Dropped from roll,	5		
Dismissed,	1		
Withdrawn,	7		
Total number dropped, etc.,		13	
Total withdrawals during 1905,			42
Number of cadets in the school Jan. 1, 1906,			95
Seamanship class,	16		
Engineer class,	21		
Nautical cadets,	58		

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Employment of Graduates and Cadets honorably discharged from 1893 to 1905, Inclusive.

	Graduates' Employment.							Employment of Honorably Discharged Cadets.							
	At Sea.		On Shore.		Unknown.		Totals.	At Sea.		On Shore.		Unknown.			Totals.
	Seamanship Class.	Engineer Class.	Seamanship Class.	Engineer Class.	Seamanship Class.	Engineer Class.		Seamanship Class.	Engineer Class.	Seamanship Class.	Engineer Class.	Seamanship Class.	Engineer Class.	Nautical Cadets.	
1893,	–	–	–	–	–	–	–	–	–	–	–	29	–	–	29
1894,	–	–	–	–	–	–	–	9	8	5	3	12	6	–	43
1895,	16	15	3	4	–	–	38	1	1	–	3	5	2	–	12
1896,	18	14	2	3	–	–	37	5	3	2	3	9	9	–	31
1897,	18	15	1	5	1	1	41	2	2	3	1	5	7	–	20
1898,	12	21	3	3	–	1	40	3	1	3	1	6	12	–	26
1899,	7	9	2	2	2	1	23	4	3	2	1	18	13	–	41
1900,	13	21	1	10	–	5	50	2	1	–	1	7	10	–	21
1901,	7	9	1	5	3	4	29	3	3	–	1	5	8	–	20
1902,	14	15	1	3	1	4	38	2	5	2	1	12	12	–	34
1903,	12	8	4	4	1	2	31	5	1	–	4	7	8	–	25
1904,	12	12	1	5	3	12	45	–	5	3	2	2	5	–	17
1905,	3	5	4	4	3	1	20	–	1	–	1	2	1	4	9
Totals,	132	144	23	48	14	31	392	36	34	20	22	119	93	4	328

Note. — The explanation of the difference between "418 cadets at sea," on page 17, and total number of graduates and cadets "honorably discharged at sea," given on page 22 as 346, is represented by 72 cadets dropped or withdrawn from the school without an honorable discharge in twelve years.

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Appropriations.

The appropriations for the school for the year 1905, which are here accounted for, were: —

Current Expenses.

Appropriation,		$55,000 00
Expended: —		
Pay roll,	$26,531 80	
Provisions,	14,123 15	
Text-books, instruments, etc.,	493 96	
Seamanship department,	3,845 76	
Engineer department,	5,525 74	
Repairs,	3,818 81	
Miscellaneous,	622 26	
Total amount expended,		54,960 98
Balance unexpended,		$39 02

Office Expenses.

Appropriation,		$5,000 00
Expended: —		
Salaries,	$3,440 02	
Books, stationery and postage,	677 42	
Commissioners' expenses,	449 99	
Printing annual report,	71 61	
Miscellaneous,	257 87	
Total amount expended,		4,896 91
Balance unexpended,		$103 09

Respectfully submitted,

N. M. DYER, *Chairman.*
Rear Admiral U. S. N. (Retired),
ROBERT B. DIXON, M.D.,
Hon. JOHN READ, Late U. S. N.,
Board of Commissioners.
F. STANHOPE HILL, *Secretary.*

Boston, Jan. 2, 1906.

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LEGAL AUTHORITY FOR THE SCHOOL.

AUTHORITY OF THE UNITED STATES.

[Chapter 339, June 20, 1874.]

An Act to encourage the Establishment of Public Marine Schools.

That the secretary of the navy, to promote nautical education, is hereby authorized and empowered to furnish, upon the application in writing of the governor of the State, a suitable vessel of the navy, with all her apparel, charts, books and instruments of navigation, provided the same can be spared without detriment to the naval service, to be used for the benefit of any nautical school or college having a branch established at each or any of the ports of New York, Boston, Philadelphia, Baltimore, Norfolk, San Francisco, Washington, Charleston, Savannah, Mobile, New Orleans, Baton Rouge, Galveston, and in Narragansett Bay (Acts, 1881), upon the condition that there shall be maintained at such port a school, or branch of a school, for the instruction of youths in navigation, seamanship, marine enginery and all matters pertaining to the proper construction, equipment and sailing of vessels, or any particular branch thereof.

And the president of the United States is hereby authorized, when in his opinion the same can be done without detriment to the public service, to detail proper officers of the navy as superintendents of or instructors in such schools: *provided*, that if any such school shall be discontinued, or the good of the naval service shall require it, such vessel shall be immediately restored to the secretary of the navy, and the officers so detailed recalled; and *provided*, *further*, that no person shall be sentenced to or received at such schools as a punishment, or commutation of punishment, for crime.

AUTHORITY OF THE STATE OF MASSACHUSETTS.

[Chapter 402, Acts of 1891.]

An Act to establish a Nautical Training School.

Be it enacted, etc., as follows:

Section 1. The governor with the advice and consent of the council shall appoint, as soon as practicable after the passage of

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this act, three citizens of this Commonwealth, who shall constitute a board of commissioners of the Massachusetts nautical training school, and who shall hold office for terms of one, two and three years respectively, from the first day of July in the year eighteen hundred and ninety-one, and until their successors are appointed and qualified; and before the first day in July in each year thereafter one commissioner shall be appointed in like manner, to hold office for the term of three years. Vacancies may be filled for the residue of a term by appointment, and a commissioner may be removed at any time for cause, to be stated in the order of removal. All appointments and removals shall be made by the governor with the advice and consent of the council.

SECTION 2. Said commissioners shall serve without compensation, but they shall be reimbursed from the treasury of the Commonwealth for all expenses actually incurred by them in the performance of their official duties.

SECTION 3. Said commissioners shall provide and maintain a nautical training school for the instruction and training of pupils in the science and practice of navigation; shall furnish accommodations for the school on board a proper vessel; shall from time to time purchase and provide such books, stationery, apparatus and supplies as are needed in the work of the school; shall appoint and remove instructors and other necessary employees, and determine their compensation; shall fix the terms and conditions upon which pupils shall be received and instructed in the school, and discharged or dismissed therefrom; and shall establish all rules and regulations necessary for the management of the school. For the purpose of giving the pupils of the school a practical knowledge of navigation and the duties of mariners, said commissioners shall from time to time provide for the making of cruises in or from the harbor of Boston.

SECTION 4. Said commissioners are authorized to receive from the United States government, and to use for the accommodation of the school, such vessel or vessels as the secretary of the navy may detail for that purpose.

SECTION 5. In order to properly maintain the said nautical training school, the commissioners may expend a sum not exceeding fifty thousand dollars, which shall be paid from the treasury of the Commonwealth on properly approved vouchers, which shall be approved by the governor and council and presented to the auditor of the Commonwealth for allowance in the same manner as other claims against the Commonwealth: *provided, however*, that no expenditure shall be made or allowed until a vessel suitable for the proposed nautical training school shall have been furnished by the United

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States government and turned over to the Commonwealth, and the same approved of and accepted by the governor and council.

SECTION 6. Said commissioners shall annually in the month of January make a report to the legislature, presenting a detailed statement of all moneys appropriated and expended for the purposes of the nautical training school during the year preceding; also stating the results of the work during such year, and making such recommendations as seem to them proper.

SECTION 7. This act shall take effect upon its passage. [*Approved June 11, 1891.*

VOTE OF EXECUTIVE COUNCIL UPON ACCEPTANCE BY THE COMMONWEALTH OF MASSACHUSETTS.

COMMONWEALTH OF MASSACHUSETTS,
COUNCIL CHAMBER, BOSTON, Nov. 9, 1892.

The committee on military affairs, to whom was referred the matter of the approval of the United States ship "Enterprise" for the purpose of a nautical training school, submit the following report.

E. V. MITCHELL, *for the Committee.*

Chapter 402 of the Acts of the year 1891 provides for the establishment of a nautical training school in this Commonwealth, and section 2 of said act authorizes an expenditure of fifty thousand dollars to properly maintain the proposed school, and also provides for the furnishing by the United States government of a suitable vessel for such school which shall be turned over to the Commonwealth and accepted by the Governor and Council; and whereas, the United States having furnished a suitable vessel and the same having been examined by the Executive Council, it is hereby —

Ordered, That the United States ship "Enterprise" be approved and accepted for the proposed nautical training school.

Approved in council, Nov. 9, 1892.

E. F. HAMLIN, *Executive Clerk.*

A true copy.

Attest: E. F. HAMLIN, *Executive Clerk.*

MASSACHUSETTS NAUTICAL TRAINING SCHOOL.

ESTABLISHMENT.

Under the authority of the above acts, the Secretary of the Navy, on Oct. 28, 1892, turned over to the authorities of the State of Massachusetts the United States steam sloop of war "Enterprise," as a vessel suitable for the purpose.

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RECENT LEGISLATION.

[Chapter 171, Acts of 1903.]

An Act relative to the Amount which may annually be expended for the Maintenance of the Massachusetts Nautical Training School.

Be it enacted, etc., as follows:

Section 1. Section five of chapter forty-five of the Revised Laws is hereby amended by striking out the words "not more than fifty thousand dollars," in the first and second lines, and inserting in place thereof the words: — such sum as the general court may from year to year appropriate, — so as to read as follows: — *Section 5.* They may annually expend such sum as the general court may from year to year appropriate, which shall be paid by the Commonwealth; and they shall annually submit an estimate of the expense required in making cruises in or from the harbor of Boston, and the amount of said estimate, after approval by the governor and council and subject to the provisions of chapter six, shall be advanced to the commanding officer of the vessel detailed therefor, who shall give a bond in the sum of ten thousand dollars, with sureties approved by the governor and council, for its proper disbursement. Said advance shall not exceed ten thousand dollars for six months, and shall be accounted for by properly approved vouchers, within thirty days after the termination of said cruises.

Section 2. This act shall take effect upon its passage. [*Approved March 23, 1903.*

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PUBLIC DOCUMENT . . . . No. 48.

REPORT

OF THE

BOARD OF METROPOLITAN PARK COMMISSIONERS.

JANUARY, 1906.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Approved by

The State Board of Publication.

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CONTENTS.

	PAGE
List of Officers,	5
Report of the Commissioners,	7
Report of the Secretary,	18
Report of the Landscape Architects,	41
Report of the Engineer,	44
Financial Statement,	73
Appendix: Proceedings of Apportionment Commission: —	
General Apportionment under Chapter 419 of the Acts of the Legislature for the Year 1899,	97
Wellington Bridge Apportionment under Chapter 491 of the Acts of the Legislature for the Year 1901,	115

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OFFICERS.

Commissioners.

WILLIAM B. DE LAS CASAS, *Chairman.*

EDWIN B. HASKELL. EDWIN U. CURTIS.

DAVID N. SKILLINGS. ELLERTON P. WHITNEY.

Landscape Architects.

Advisory.

OLMSTED BROTHERS.

Engineer.

JOHN R. RABLIN.

Law and Claims.

GEORGE LYMAN ROGERS.

Secretary.

JOHN WOODBURY.

OFFICES, 14 Beacon Street, Boston, Mass.

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Commonwealth of Massachusetts.

REPORT.

The Metropolitan Park Commission presents herewith its thirteenth annual report.

The Board has continued its work during the past year chiefly along two lines, — the care and maintenance of the portions of the Metropolitan Parks System already acquired, and the development and extension of other portions under the continuing appropriations made available by chapters 419 and 429 of the Acts of the Legislature for the year 1903.

There have been few changes in the acreage of the reservations and parkways. The most important addition has been the acquirement of most of the land required for a parkway from Revere Beach toward Winthrop, and of this the larger part was a gift of the Boston, Revere Beach & Lynn Railroad. Other small pieces of land have been acquired, and a few transfers have been made for the purpose of improving the acquirements previously made or of facilitating their development for public use. Investigations have also been made as to the feasibility of purchasing other lands at agreed prices, to provide for the completion of other portions of the system during the coming year. It is now the well-understood policy of the Board under present appropriations to avoid as far as possible the taking of land by power of eminent domain, except in cases where the cost has been first determined by previous agreement as to the price.

The total area of the holdings in the Metropolitan Parks System is 10,053.70 acres, of which 9,380.25 acres are

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classed as reservations and the remaining 673.45 acres as parkways. This includes 7,326.63 acres of woodland, 47 miles of river frontage, 9.86 miles of beaches and 25.55 miles of parkways. Further details are given in a table on page 20 of this report.

Land claims amounting to $63,227.87 have been disposed of during the year. No large land claim is now in suit, and the aggregate of the several small claims remaining unpaid is provided for by funds reserved to meet them. The condition of the loans on Dec. 1, 1905, is briefly summarized as follows: —

Metropolitan Parks Loan: —	
Appropriations and receipts,	$8,188,334 01
Expenditures,	7,973,830 83
Balance in hands of State Treasurer,	$214,503 18
Metropolitan Parks Loan, Series II.: —	
Appropriations and receipts,	$4,514,907 41
Expenditures,	4,260,745 88
Balance in hands of State Treasurer,	$254,161 53
Nantasket Beach Loan: —	
Appropriations and receipts,	$705,881 50
Expenditures,	705,881 50

Important construction work carried on during the year has advanced the system to an increased public use. Blue Hills Parkway has been extended from Canton Avenue to and through the Blue Hills Reservation to the headquarters on Hillside Street in the form of a single woods road, which, although only a part of the design for its ultimate completion, will be ample for all needs for many years to come, and will be more attractive in the mean time because kept in its simpler form. An office building, with dormitory and detention rooms, and a tool house to replace one destroyed by fire, have been finished, and a caretaker's house near by has been remodelled. A new path has been built from Hillside Street to the top of Great Blue Hill, and on Canton Avenue a refectory has been added to the group of buildings about the railway station at the foot of the main path to Great Blue Hill. Furnace Brook Parkway has been sub-

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BLUE HILLS RESERVATION. — Unquity Road.

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graded from Adams Street to the Blue Hills, and a bridge over the Granite Branch Railroad nearly completed. This portion of the parkway will be surfaced during the coming year. A short woods road in extension of the parkway is also being built, and in connection with the other woods roads already built will provide a circuit drive in the easterly portion of the reservation and a connection with Randolph Avenue. A contract for sub-grading a shore drive along Quincy Bay has been let, to be completed during 1906. At Boylston Street, Newton Upper Falls, construction has been well advanced upon a new bridge and dam of reinforced concrete with stone facing, similar in appearance to the older arch bridges upon the river. With other incidental structures to be completed during the coming year, this dam and bridge will replace those formerly at this point, provide a greatly needed improvement in the highway and restore the beauty of Hemlock Gorge. Construction of a roadway along the river front of the United States Arsenal grounds will be begun as soon as plans transferring the land have been executed by the United States government. Such transfer is authorized by special act of Congress, and the plans have been approved in preliminary form by the Secretary of War, so that it may be reasonably expected that this work will begin during the coming year. Lowell Memorial Park, Cambridge, which was originally acquired with the aid of funds provided by a committee of Cambridge citizens, has been marked, at their request and with the aid of their further gifts, as a memorial to James Russell Lowell, by an enclosing wall of brick and limestone, and at the points where Fresh Pond Parkway passes through the park, by posts bearing tablets with memorial inscriptions by President Charles W. Eliot of Harvard College. The driving road, sidewalk and planting space and bridges of Revere Beach Parkway between Main Street, Everett, and Fellsway near Wellington Bridge, have been finished and opened to public use. There is now a continuous park drive from Middlesex Fells and the surrounding municipalities and from Broadway Park in Somerville, a point two miles distant from the State House, through Everett, Chelsea and Revere, to Revere Beach,

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This parkway and the driveway along Revere Beach, which is nearly completed, with the State highway and its extension to Ocean Street in the city of Lynn, will provide the shortest and most convenient driving road between Boston and the northern suburbs and the North Shore beyond, and will in some measure rival the park drives to the south of Boston.

The bath-house which this Commission was directed to build at Nahant Beach close by the city of Lynn was built and opened in time for a considerable use during the past summer. At the same time important changes were made in the alignment of the Nahant Road near by, to provide that heavy travel and electric cars might pass behind the bath-house, and that the road in front of the bath-house upon the ocean side might be reserved for pleasure uses.

King's Beach has been improved by a sea wall and esplanade from the monument in Swampscott to and around Red Rock in Lynn, and has already proved so satisfactory that a very strong public demand has been made for the extension of the improvement along the intervening strip of shore between Red Rock and the Nahant-Lynn Bath-house. Careful investigation is being made as to the cost of this extension. If it is found that it may be provided with available funds, it will not only be attractive in itself, but also add to the attractiveness of the portion already built, and furnish a connection with the Nahant Road which will bring into use a continuous ocean driveway six miles long, and of almost unrivalled beauty and usefulness.

Contracts for sub-grading an extension of the Mystic Valley Parkway along the banks of Mystic River to Alewife Brook, Powder House Boulevard in Somerville, and thence as a driveway along the river bank in Medford to Cradock Bridge, have been nearly completed. The bridges for this driveway are to be built during 1906, but further work cannot be done until after a decision is received from the State Board of Health upon the petition made in January, 1905, by this Board for permission to build a dam across Mystic River at Cradock Bridge. A decision in this matter will probably not be received until the Board of Health has com-

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pleted the investigation and report in regard to Alewife Brook required of it under chapter 445 of the Acts of 1904.

Woods roads in Middlesex Fells along the westerly side of Winchester South Reservoir and thence to Forest Street have been completed. They are built upon permanent lines, and open up many beautiful views and provide a convenient means of crossing the westerly half of the reservation. Their cost has been met in part by the gift of $4,000 from Messrs. Peter C. and Shepherd Brooks.

The matter of a street railway location in Fellsway from Somerville to and through Middlesex Fells to Stoneham has received careful attention during the past year. No formal grant has been made, but there is no delay or unwillingness on the part of this Board to make grants under reasonable regulations for the protection of the reservations and parkways and of the public. Public hearings were held on March 30, 1904, on petitions of the Boston Elevated Railway Company for a location from its tracks in Broadway, Somerville, to the Stoneham line, and of the Boston & Northern Street Railway Company for a location from that point to its tracks in Main Street in Stoneham. Careful and extended studies were made by the Landscape Architects and Engineer of the Commission, to determine a feasible line; and on Nov. 17, 1904, drafts of proposed locations and plans were informally communicated to the street railways. As a result of conferences, on April 5, 1905, an amended form of grant was submitted to the Boston Elevated Railway Company, preliminary to submitting an amended grant to the Boston & Northern Street Railway Company. No reply has been received except by informal inquiries and suggestions as to minor changes in the route, which have been in general informally assented to by this Board. As soon as the investigations thus being made are completed to an extent which warrants further action, the Board expects to provide for a short necessary extension of Fellsway, and to execute the formal papers of grant.

The maintenance and administration of the reservations and parkways have presented few new problems which call for special comment at this time. This is in a measure

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evidence that the organization of the forces employed by the Board and the services rendered by these forces has been satisfactory. The superintendency of Blue Hills Division, made vacant by the death of Frank Dings, who for several years filled the position with faithful zeal, has been filled by advancement of Bartholomew J. Costello, formerly a sergeant in the United States Army, and for several years past a faithful officer and sergeant of the Metropolitan Park Police.

Nahant Beach Bath-house was opened in July as a branch of Revere Beach Bath-house, and was placed under the general supervision of Supt. Herbert W. West of Revere Beach Division, with an assistant who was advanced after several years of faithful service as a life-guard at Revere and Nantasket. Excellent service was maintained at this bath-house as well as at the other bath-houses, and the patronage was generally satisfactory, considering the coolness of the month of August.

Very serious problems in the administration and care of the roadways have been presented as to their use by automobiles. The restraint of reckless drivers, who do not understand that the roads of the park system, being provided for pleasure driving, ought not to be used by any one class of drivers in a manner which will cause danger or nervous worry to others, has required the making of rules to restrict speed, and has required at times the arrest or summons to court of those who violate the rules. This course has occasionally caused annoyance to people whose acts were perhaps not evidence of their intentions, and has caused some regrettable misunderstandings. It was very satisfactory to find during the past summer that a police officer mounted on a motor-cycle could restrain most of the reckless driving. The Commission, therefore, gladly revised its rules, and made them as liberal as even the counsel of the Massachusetts Automobile Association felt justified in recommending. The result has proved generally satisfactory, and since the change was made there have been few violations of the new rules and consequently few arrests.

The wear and tear of the roadways have been seriously in-

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NAHANT BEACH PARKWAY — Nahant Beach Bath-house.

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creased by swift-moving automobiles, which tear off the surface; and the expense for repairs has correspondingly increased beyond what was reckoned upon when the roads were built. With a view to securing an improved surface, experiments have been made with tar and petroleum treatment, but no satisfactory result has been secured thus far. It is evident, however, that effective construction and maintenance will require increased expense, and that for the present at least the period for watering will have to be extended.

The Legislature of 1905 made maintenance appropriations by items instead of as a lump sum. This method permits no transfers, and obviously requires that each item of the appropriation be large enough to cover the largest probable expense in the item for the year, and on the whole cannot result in economy in the cost of such maintenance. A good example is afforded in the experience of this Board in the maintenance of the driveway at Winthrop, where unusual repairs have been required during the past year to repair damage done by a very severe winter storm. A saving in the cost of watering made possible by unusually favorable conditions of wind and weather could not be made available for these extraordinary repairs; and, as the money appropriated for repairs was soon exhausted, less than the usual amount of roadway repairs could be made in 1905, and a larger amount of repairs than usual will have to be made in 1906.

Nantasket Beach presents a problem of maintenance in regard to its roadway which has not yet been adequately met. The loan appropriations have not been sufficient to provide for a development of the reservation corresponding to its needs, nor to the development provided for at other shore reservations. Each year the roadway known as County Road requires serious repairs, not only to provide for the throngs who come to the beach during the summer, but also for the ordinary highway uses which it must serve for the town of Hull, to which it is the only approach. The maintenance appropriation for each year provides for only temporary repairs, and these are greater than they ought to be

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because of the bad alignment, grade and construction of the roadway. The previous recommendations of the Board for an appropriation sufficient to provide for permanent reconstruction of this roadway, and for protection of the reservation by acquirement of the rocky shore to the southeast, are renewed at this time.

The most serious problem of maintenance before the Board at the present time is that presented by the gypsy and brown-tail moths. Each year since systematic work by the Board of Agriculture was suspended these pests have increased everywhere with great rapidity. Meantime, public opinion has been divided as to the course of action to be pursued, and all action has been sporadic, and, speaking generally, ineffective. Various methods of repression have been tried, and more or less difference of opinion has developed as to which method is most effective. As a result, public opinion has been blinded to the real seriousness of the situation, and a timidity has governed the action of individuals and municipalities and of the State and of this Board in regard to the matter. Last year new legislation was enacted, under which the State resumed in a measure its responsibility for the work of repression, and required co-operation by individuals and municipalities. This legislation came too late for work to check the destructiveness and spread of the pests during 1905, but has led to work for repression in 1906 which is more extended than that of any previous year; and much may be hoped for if this activity is supplemented by continuous work and provision therefor as necessity may warrant. Last year the Legislature appropriated altogether $27,000 for the work in the almost 10,000 acres of the Metropolitan Parks and Parkways. The amount proved insufficient, and was less effective than it would otherwise have been because it did not become available until March 17. Yet the measures made possible by this appropriation were so effective in the localities where complete work could be done that the foliage of trees upon the parkways, for example, was preserved even in sections where uncared-for trees upon immediately surrounding land were completely defoliated.

In the Middlesex Fells, where the most serious infestation existed, the methods adopted were efficient for the localities

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where thorough work could be done, and where the lands were not near outside uncared-for lands, but were not sufficient to prevent an extended spread of the pests to points within the reservation where limited time and money made thorough work impossible. The special appropriation was exhausted by September. Serious consideration of the matter, and conference with Dr. Kirkland, the newly appointed Superintendent of the State for work against the gypsy and brown-tail moths, resulted in an understanding that he should inspect all the reservations and warn this Board of any spread of the moths, and that he should use his most serious efforts to suppress the moths in the neighborhood of all the reservations and parkways. Under these circumstances, and in view of the strong public feeling that it was useless to require work in the outside lands near the reservations and parkways unless efficient work was done within them, the Commission decided that so serious a condition existed as to warrant the use of a portion of the general funds of the loans until the time when the matter could be presented to the Legislature of 1906, and considered in connection with the maintenance appropriations for the year. In the Blue Hills, where Dr. Kirkland found for the first time that several colonies of the gypsy moth had established themselves, the work was immediately turned over to his supervision, to be done at the expense of the funds of this Board; but in the other reservations and parkways the Commission retained its charge of the work, subject to general inspection and advice from the State Superintendent. The result is that the work is in a much more advanced condition than ever before, and has been so conducted that a larger part of the fundamental work preliminary to direct work of repression has been done throughout the reservations than in any other previous year. In this work it has been the effort to first protect the surrounding municipalities and private lands against a spread of the gypsy moth from the reservations, and for that reason work has been done first on the outer portions of the reservations. This work will be extended to the rest of each reservation, if funds are provided in time for such work. It is impossible to make absolute predictions as to the efficiency of any class of work

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against these pests, but it may be stated with certainty that there is no possibility of effective repression except by thorough work extended over the entire region which may afford food and cover to the gypsy moth; and that it is not possible to do progressively effective work if the appropriation of funds is postponed each year until after effective work can be done, nor if it is postponed or done with half-way measures until an effective parasite has been developed. Delay means a deliberate taking of chances that a large part and perhaps all valuable trees will be destroyed. Nor ought effective work to be postponed until an agreement is reached as to which method of repression is best. Removal of diseased and overcrowded trees, creosoting of nests, banding trees with such sticky materials as will not injure them, destroying the caterpillars, spraying, surrounding the worst colonies with lines of oiled hay or boards smeared with sticky substances, and even burning over the ground, are all effective measures, which must be used as opportunity and the necessities of each case seem to warrant.

The comparative cost and availability under all circumstances of the various methods of work is being gradually determined; and the experience gained is making it certain that, while any single locality may be almost absolutely protected, yet only prompt, continuous work over the entire area infested will effectively reduce the amount of work to be done in each year, and will bring a general repression even equal to that which existed a few years ago. It is therefore hardly possible to limit the earnestness of language with which this Commission urges that adequate and prompt provision be made for efficient work wherever the gypsy moth exists, and that such provision be continued until the moth is completely checked; and that at the same time every reasonable effort be made under the State and national authority and supervision to find some parasite or more effective method of destroying both the gypsy and the brown-tail moths. The extreme work and expense now required from every land owner is bringing about the destruction of a large part of the woods in the Metropolitan District. It is therefore all the more important that the reservations of the Metropolitan Parks System be saved.

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MIDDLESEX FELLS RESERVATION. — Brooks Road and Porter's Cove.

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In view of the facts above stated, it is recommended that the Metropolitan Parks Loan be recompensed by an appropriation to restore the funds necessarily used before the annual appropriations could become available, and that this amount be increased by a substantial further amount, to be available for the contingencies of this most uncertain work whenever the maintenance appropriations are insufficient for the work which seems to be advisable before the maintenance appropriations of the following year can become available.

The work in which this Board is engaged was outlined in its general form in the report and plan submitted by a preliminary commission to the Legislature of 1893. Its beginning was authorized by chapter 407 of the Acts of 1893, known as the Metropolitan Park Act. It has been advanced from year to year under additional appropriations and legislation, of which the most important was that of chapter 288 of the Acts of 1894, known as the Boulevard or Parkway Act, and that of chapter 464 of the Acts of 1899, known as the Nantasket Beach Act. This legislation and the appropriations have generally resulted from public petition and hearing before the Legislature to enable or direct the Commission to carry out detailed plans for some portion of the general plan presented by the preliminary commission. Singularly few additions or changes have been made except in details. In 1903 this work had so far advanced that considerable appropriations were made, as above stated in this report, to provide for annual work for five years in completion of the Metropolitan Parks System. The result has been steady, consistent and economically accomplished progress, which, at the completion of a work now planned and entered upon for the full period of five years, will at the expiration of that period in 1907 show a substantial completion of the plan of the preliminary commission.

All of which is respectfully submitted,

WILLIAM B. DE LAS CASAS.
EDWIN B. HASKELL.
EDWIN U. CURTIS.
DAVID N. SKILLINGS.
ELLERTON P. WHITNEY.

DEC. 13, 1905.

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REPORT OF THE SECRETARY.

Hon. WILLIAM B. DE LAS CASAS, *Chairman, Metropolitan Park Commission.*

SIR: — I herewith present my report for the year ending Dec. 1, 1905. It is subdivided as follows: 1. Acquirement of lands. 2. Administration. 3. Miscellaneous. 4. Finances.

1. ACQUIREMENT OF LANDS.

The area of park lands has not been increased by any large additions during the past year. In Revere a strip of land 70 feet in width has been acquired, extending from Charles Eliot Circle at the south end of Revere Beach to Leverett Avenue; and a block of land containing 1.39 acres, lying between this point and the sea, has also been purchased. This extension from Revere Beach Reservation is designed to form the first link in the connection by suitable roadways of Revere Beach with the driveway at Winthrop Shore. The land between Eliot Circle and Leverett Avenue is substantially all contributed to the proposed improvement by the owner, the Boston, Revere Beach & Lynn Railroad. Nahant Beach Parkway has been extended by the purchase of a block of land in Lynn lying between the Lynn and Nahant boundary line and Washington Street in Lynn. The land thus obtained made it possible to lay out a street for traffic purposes in the rear of the new Nahant Beach Bath-house, and to exclude all but pleasure travel from the portion of Nahant Road which passes in front of the bath-house. A location in this new street was also given to the electric railway recently opened between Lynn and Nahant, so that it does not interfere with the comfort or pleasure of persons using the roadway along the crest of the beach. In Winchester a small parcel of land on Bacon

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Street has been purchased for the purpose of improving the entrance into Mystic Valley Parkway at that point. In Quincy land has been taken for the slopes to the Granite Branch Bridge of the Old Colony Railroad, where it crosses Furnace Brook Parkway; and an exchange of land has been made with an adjoining owner at Crescent Street, in order to arrange suitably the junction of the street with this parkway. In settlement for land taken for Fresh Pond Parkway, and as consideration also for the imposition of parkway restrictions on abutting lands, two irregular parcels of land at the intersection of the parkway with Larch Street in Cambridge have been conveyed to the adjoining owner. Fellsmere Park in Malden through which Fellsway East passes has been transferred for care and control by the city of Malden to this Commission, and an adjoining estate at Vista Street which is needed for future development has been bought at private sale. A portion of the land taken in Boston for the approach to Mattapan Bridge at the beginning of Blue Hills Parkway has been transferred to the control of the city of Boston, and has been incorporated in Mattapan Square. A few acres of land in Canton have been purchased which were needed for improving the boundaries of the land given to the public by the late Henry L. Pierce as a part of the Blue Hills Reservation, and a taking to confirm the title has been made of all the lands in Canton and Randolph shown on the Pierce plan. In building a portion of the North Border Road of Middlesex Fells Reservation in Stoneham, it was found desirable to acquire a small lot of wild land near the Bear Hill Entrance. The construction of the driveway at Revere Beach from Revere Street to the Point of Pines leaves at several points small strips of land between taking and construction lines, and these strips are being sold to the abutting owners at a nominal price, for the purpose of bringing about an orderly development of the adjoining property. Similar strips at Winthrop Shore which were not required for the driveway as constructed have also been conveyed in the same manner. The remainder of several estates which were acquired by purchase at Lynn in the acquirement of the Lynn Shore Reservation have also been

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sold, and will be developed by the purchasers in accordance with the plan of the reservation. At Milton a small parcel of land at Milton Lower Mills was released to the owners of the Chocolate Mills, as it seemed to be necessary for the proper development of their manufacturing plant and not essential to the park holdings at that point; and for similar reasons, a small strip of river bank in Waltham was reconveyed to the Waltham Gas and Electric Company.

2. Administration.

The method of administration has not been changed. The work of the Commission is divided among the departments of Landscape Architects (advisory), Engineering, Law and Claims, and Superintendence, each department reporting to the Commission through the Secretary. The general office and Engineering Department are located at 14 Beacon Street, in Boston. The general office force, in addition to the Secretary, consists of four clerks and stenographers, purchasing clerk, paymaster, telephone clerk and messenger. Additional clerical assistance has been found necessary the past year, and the clerical force will need to be slightly increased the coming year. Three stenographers are employed in the Law and Claims Department. The Engineering Department employs 45 persons, in addition to the Chief Engineer. The reservations and parkways are grouped in seven divisions, each of which is in charge of a superintendent who is held responsible for the maintenance and policing of his division. The number of laborers employed varies with the season of the year and the amount of work on hand. A considerable force has been employed for a large part of this year in the work of suppression of the gypsy and brown-tail moths. The police force consists of 7 sergeants, 2 inspectors and 79 patrolmen. The police are assigned and transferred in the divisions according to the requirements in each from time to time; and in seasons when police work does not necessitate the use of the entire force, a portion of the men are required to assist in suitable work in the reservations.

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Landscape Architects.

The report of Olmsted Brothers, the Landscape Advisers of the Commission, is presented in an Appendix to this report. In it will be found a summary of the matters upon which they have been called upon to render service, and the explanation they desire to make in regard to the work they have done.

Engineering Department.

A large amount of important construction work has been carried on this year under the direction of this department. An extension of Blue Hills Parkway in Milton has been built from Canton Avenue to Harland Street, and from that point a new entrance road to the reservation has been constructed, which brings one into Hillside Street a short distance from Hoosicwhisick Pond. There is now, therefore, a direct route provided from Grove Hall in Boston to the heart of the Blue Hills. The sub-grading of Furnace Brook Parkway in Quincy from Adams Street to the Blue Hills Reservation is completed. A concrete bridge with rock facing has been built to carry the Granite Branch of the New York, New Haven & Hartford Railroad over this parkway at West Quincy, and will probably be in use in a few weeks. In the Blue Hills a connection between Furnace Brook Parkway and Saw Cut Notch Road is already built, and an extension of this road is under way which will end at the Administration Road which runs through the centre of the reservation. The westerly roadway of Neponset River Parkway between Brush Hill Road and Blue Hill Avenue in Milton is built, and the space reserved for electric cars is already occupied by the location of the Blue Hill Street Railway, which furnishes a means of transportation to the foot of Great Blue from Readville, in addition to its earlier route from a connection with the Elevated Railroad at Mattapan Square. Work has been begun on sub-grading the driveway along Quincy Shore between Squantum Street and the National Sailors' Home. This driveway will ultimately connect with Furnace Brook Parkway, and thus with the Blue Hills. The last section of Revere Beach

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Parkway, between Main Street in Everett and Fellsway in Medford, has been finished, and was opened to public use on August 2. This is now the longest parkway of the Metropolitan System. It is already largely used, and will undoubtedly be more used when the connecting roadways between Revere Beach and Lynn are ready for travel. The work of extending the development of Revere Beach from Revere Street to the Point of Pines has continued through the year. The roadway is substantially completed to a point below Oak Island, but considerable sub-grading remains to be done from that point to the Point of Pines property. The surfacing of this portion and of Lynnway from the end of the reservation to Saugus River Bridge will have to be postponed until spring. Saugus River Bridge is completed, including the installation of a Scherzer roll draw. On the Lynn side of the bridge the Massachusetts Highway Commission have made good progress in completing the approach from Commercial Street to the bridge. The city of Lynn has begun the construction of a highway in extension of this route from Commercial Street to Broad Street, and it seems probable that within a year it will be possible to drive over these connecting parkways and highways from Broadway Park in Somerville to Broad Street in Lynn, a distance of 11 miles. At Lynn Shore the sea wall which was constructed last year has been carried around Red Rock and to the present boundary line of the reservation. The roadway along the top of the bluff and the granolithic promenade along the top of the wall have been completed. The driveway was opened to public use on September 18. At Nahant Beach, Nahant Road in front of the new bath-house was relocated and raised so as to permit the construction of subways to the beach from the bath-house. The portion of the highway transferred to the Commission by the town is 1,125 feet long. Concrete edgestone and gutters were built on both sides of the road, and a granolithic walk laid in front of the bath-house. A traffic road was built in the rear of the bath-house, in which also the electric car line has its rails. The road in Middlesex Fells from the east dam of the Winchester South Reservoir to Porter's

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Cove at the southwesterly corner of Spot Pond is completed, and a spur from this road to the road leading to Winchester across the Causeway is also finished. These roads offer some of the finest views in the Fells. Considerable work has been done on Mystic River in Medford, Arlington and Somerville. The work has been dredging and straightening of the river channel and depositing the material on the banks, where it will be needed in building the extension down river of Mystic Valley Parkway. At Newton Upper Falls on the Charles River a concrete bridge with rock facings is under construction to carry the highway known in Newton as Boylston Street and in Wellesley as Worcester Street. This bridge consists of two arches, of 50 feet and 14 feet span respectively. The bridge, including parapet walls, is 73 feet wide, and carries the tracks of the Boston & Worcester Street Railway Company in the centre. The old dam at this point, which was in bad repair, is being replaced by a concrete dam of the same height. A beginning has been made on a path along the line of the future driveway on the northerly bank of the Charles River between Arsenal Street in Watertown and the Cambridge Hospital. The Engineering Department, in addition to the larger work, of which the details are given in the report of the Engineer, has furnished engineering supervision for minor work in the reservations and parkways; has furnished inspection to ensure the compliance with the terms of permits issued by the Commission to towns, cities, corporations and individuals to do work of various kinds on park land; has inspected and reported on condition of bridges; has prepared plans and estimates in connection with proposed work of the Commission; and has made the usual variety of plans required by the various departments in the course of their work.

Law and Claims Department.

Outstanding claims for land takings to the amount of $63,227.87 have been disposed of during the past year, and were divided among the reservations and parkways as follows: Charles River Reservation, 1; Neponset River Reservation, 1; Mystic River Reservation, 1; Winthrop Shore

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Reservation, 1; Blue Hills Reservation, 4; Revere Beach Parkway, 2; Middlesex Fells Parkway, 3; Furnace Brook Parkway, 3; Nahant Beach Parkway, 1; Winthrop Parkway, 2; Neponset River Parkway, 1; Mystic Valley Parkway, 1; Fresh Pond Parkway, 1. There remain to be adjusted 33 claims, divided as follows: Blue Hills Reservation, 1; Charles River Reservation, 9; Neponset River Reservation, 8; Mystic River Reservation, 2; Quincy Shore Reservation, 1; Revere Beach Parkway, 4; Middlesex Fells Parkway, 4; Mystic Valley Parkway, 1; Furnace Brook Parkway, 2; Neponset River Parkway, 1. The policy of the Commission, to avoid as far as practicable any further acquirements of land unless satisfactory prices therefor are first obtained in the form of binding options, has been satisfactorily followed during the past year, and no new claim of substantial amount has been created. The legal work of this department, outside of the trial of cases, has continued to be in the charge of George Lyman Rogers, Esq., and his assistant, Stanley M. Bolster, Esq., who are designated by the Attorney-General for this purpose.

Superintendence.

The reservations and parkways of the Metropolitan Parks System are for convenience of administration grouped in seven divisions, as follows: Blue Hills Division; Middlesex Fells Division; Revere Beach Division; Speedway Division; Riverside Division; Nantasket Beach Division; Beaver Brook Division. Each division is in the charge of a superintendent, who reports directly to the Commission through the Secretary. The regular work of maintenance and policing has been described in previous reports, and requires no further mention at this time than to call attention to the fact that it steadily increases in detail with the development of the system and the increased use of the parks by the public. Matters of special interest are as follows: —

Blue Hills Division: Bartholomew J. Costello, *Superintendent.*

Frank Dings, who had been superintendent of the Blue Hills Reservation and the other reservations and parkways administered with the Blue Hills for a period of ten years,

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died on April 15. His faithful service has been noted by the Commission on its records, and his deep interest in the work in which he was engaged will be remembered by all with whom he was brought in contact. Bartholomew J. Costello, who had been acting superintendent during Mr. Dings' illness, was appointed superintendent on September 10. The new roads in the Blue Hills and the extension of Blue Hills Parkway from Canton Avenue to Harland Street, which have already been described, have been built by the forces of the reservation under the direction of the superintendent and with the assistance of the supervisor of construction. A path has been built from the summit down the eastern side of Great Blue. It leaves Charles Eliot Path a short distance from the memorial bridge, and passing down through Wild Cat Notch leads across the hills to Hillside Street a few steps from Hoosicwhisick Pond. In conjunction with the old summit path from Canton Avenue it furnishes an interesting walk with extensive views. A concrete wall and iron fence have been built around the observatory, of a design approved by the Commission. A simple refectory building has been built at the foot of Great Blue Hill, near the car station of the Blue Hill Street Railway Company. Roads have been repaired, many of the short bridges have been replaced by drain pipe culverts, old and new roads, paths and fireguards have been cut out. Considerable forestry work has been done in the line of pruning and thinning, and 30,000 pine seedlings have been planted. The stone office building, which was in course of erection on Hillside Street at the date of the last report, was completed at a most convenient time. On the night of February 20 the old wooden building used for office and tool house took fire, apparently from a defective chimney, and it and the contents were completely burned. The office and headquarters are now conveniently situated in the new building, and a new work shop and tool house has been built in a more convenient location. The completion of the new headquarters building has led to the rearrangement and grading of the grounds around headquarters, which now have an attractive appearance and are conveniently arranged for administrative purposes. In connection with these changes an old farm-

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house near the stable was altered over for a boarding house, where several of the police and employees are accommodated. The area of the reservation is so large that it is very desirable to have a number of the employees within close call of headquarters. In Stony Brook Reservation the dam at the skating pond has been repaired and some forestry work done. Along Neponset River the park holdings have been kept clean, and at Mattapan the fences and walls of the old Hollingsworth place have been removed and the grounds opened to the public. Fences have been built along the boundaries of that portion of Neponset River Parkway between Brush Hill Road and Blue Hill Avenue, and a portion of this parkway in Hyde Park near the Sturtevant Blower Works has been graded, so that the people living near by may use the land for a playground until it is required for the construction of the parkway. At the junction of Blue Hills Parkway and Canton Avenue a rearrangement of the roadway and grass spaces has been made in connection with the extension of the parkway. Quincy Shore has not called for anything but the usual care and policing. The brook in Furnace Brook Parkway has been cleared, some fencing has been done, and the trees at the Dorothy Q. House given attention. The gypsy moth has appeared in the towns and cities in the vicinity of the Blue Hills, and some traces have been found of this pest in the reservation itself. Work has already been started, in the hopes that it may be possible to suppress the pest before it gets beyond control and does irreparable damage, and to be effective must be actively continued during the coming year.

MIDDLESEX FELLS DIVISION: C. P. PRICE, *Superintendent.*

The most serious problem in the Middlesex Fells Reservation this year has been that caused by the gypsy and brown-tail moths. A large amount of work has been done in thinning out the diseased and worthless trees, creosoting nests of the gypsy moth, cutting and burning to a limited extent the nests of the brown-tail moth, and banding and spraying the trees.

The new road from the east dam of Winchester South

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Reservoir to a point opposite Porter's Cove at the southerly end of Spot Pond has been completed, and a connection has been built between this road and the road from Winchester which crosses the causeway between the Winchester reservoirs. These roads afford convenient drives to the foot of Spot Pond from both West Medford and Winchester, and afford some of the most charming views in the Fells. A portion of the North Border Road in extension of South Street to Bear Hill Entrance in Stoneham has been begun and is nearly completed. Woodland Road has been widened near the entrance of Quarter Mile Road. The flock of sheep in the sheep pasture and the water fowl at Dark Hollow Pond have afforded much enjoyment to visitors, and the collection of birds and small animals at the headquarters on Pond Street has been visited by large numbers of people. During the winter season provision has been made for feeding the wild birds, many of which seem to remain on the reservation through the winter.

All buildings but two houses occupied by employees have been removed from the lands taken for Mystic River Reservation. These lands have also been cleared of gypsy and brown-tail moths.

Middlesex Fells Parkway and Wellington Bridge have called for the usual care and repairs. On one section of the parkway experiments are being made in treating the road bed with oil in several different ways, the effect of which can not yet be determined. The city of Malden has transferred the care and control of Fellsmere Park, through which the parkway passes, to this Board, and it has been cared for in connection with the parkway. This has involved a considerable amount of moth work.

The bed of Aberjona River in Mystic Valley Parkway has been thoroughly cleaned. The trees have been cleared of gypsy and brown-tail moths. The corner of Bacon Street has been rounded at its junction with the parkway, improving the approach to the parkway at this point. Water fowl have been placed upon the upper Mystic Pond. This pond has been largely used by the people of this neighborhood for pleasure boating.

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REVERE BEACH DIVISION: HERBERT W. WEST, *Superintendent.*

The use of Revere Beach by the public continues to increase. During the summer season the forces of the reservation are completely occupied with the problem of general care and policing. The continuance of good order and apparent general satisfaction on the part of the people visiting the reservation is to be noted. New shelter buildings have been constructed at Revere Street and opposite Oak Island, and concrete seats have been built on the sea side of the shelter opposite the bath-house. The bath-house was opened on June 17 and closed on September 10. The total number of bathers was 142,942. The largest number on any day was 7,171 on August 13. The receipts for the season were 31,255.24, and the expenditures for the year $30,502.29. It has been found satisfactory to make a large part of the suits required for this and the other bath-houses at the bath-house sewing room during the winter season.

Revere Beach Parkway has been much more in use since it was completed through to Medford. Beyond moth work and new tree planting only general care has been required.

The severe storms of last winter threw a large amount of material on the roadway at Winthrop Shore, and wrecked a large section of the iron fence. This is a contingency to be expected at any time, and provision for repairs of this character should be estimated in providing for the maintenance of this exposed reservation.

The portion of Lynn Shore Reservation already completed has been largely used, and on pleasant afternoons and evenings the promenade is thronged with people. The town of Swampscott has co-operated with the Commission by improving the section of Humphrey Street adjoining King's Beach, and the relocation of sidewalk and electric poles has much improved the appearance of the easterly end of this reservation. The wall around the Red Rock section has been completed, and a granolithic walk at the top of the wall leads to steps down to the ledges. The view of the Nahant Beach Bath-house in Nahant Beach Parkway is very attractive from this point. This bath-house was completed and

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WINTHROP SHORE RESERVATION. — Driveway after storm of Jan. 25, 1905.

opened on July 10. Although of a different style of architecture from either the Revere or Nantasket bath-houses, its general arrangement is much the same. The centre building contains the accommodations for administration, public sanitaries and police sub-station. On either side are the yards containing the bath-houses, of which there are 300 on the men's and 215 on the women's side. The yards connect with the beach by subways under the Nahant Road, uniting in a single exit on the beach. The cost of the bath-house, exclusive of the changes in roads and grading, was $67,794.55. The bath-house was opened on July 10 and closed on September 10. It was used by 25,065 bathers. The largest number on a single day was 1,710, on August 13. The receipts for the season were $5,086.55, and the expenditures for the year $6,365.19. A section of Nahant Road, upon which the bath-house fronts, 1,125 feet in length, was transferred by the town to the care and control of this Commission in July. This section and also the new traffic road in the rear of the bath-house has been kept in repair and lighted and watered. In co-operation with the town forester of Nahant, some planting has been done at points along the line of the parkway. Some bulkhead work has been built at points where the protection of the roadway made it advisable.

Riverside Division: Albert N. Habberly, *Superintendent.*

Considerable has been done to add to the convenience of the people using this section of Charles River. Foot paths have been built along the shore from Weston Bridge to Norumbega Tower, and along the shore of Robert's Cove and Cedar Point. Seats have been placed on the bank opposite the band stand at Riverside and at other places along the shore. Small bath-houses have been built for the use of boys and men, at Newton Lower Falls, Auburndale and Waltham. In the boating section stumps and stones have been removed from channels. During the summer, range lights were maintained from Riverside to Waltham, and proved to be of much assistance to people using the river in the evening. During the skating season a section of the river near Weston Bridge was kept cleared and was largely

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used. The use of the river for canoeing has been greater than for several years. Band concerts have been given almost every Saturday evening, either at the club houses or at the band stand on the reservation at Riverside. The annual regatta was held at Waltham on June 17, and there have been several illumination nights with displays of lanterns and fireworks. A large number of church and private picnics have been held at Pine Grove, Forest Grove and Hemlock Gorge. There has been no drowning accident during the year. The total number of accident cases treated at the emergency room and by the officers was 178, of which 170 represent cases of capsizing from canoes, falling into the water from the banks or floats and breaking through the ice. There have been 43 actual rescues from drowning by the police officers, who deserve credit for the courageous and judicious manner in which they performed their duties.

Considerable forestry work has been done along the banks of the river, fences have been renewed, paths kept clear and rubbish removed from the bank. The brown-tail and gypsy moth have appeared in this section, and vigorous work is being done to prevent damage from them.

SPEEDWAY DIVISION: JOHN L. GILMAN, *Superintendent.*

In addition to the spring and fall races, which were held under the auspices of the driving clubs, the Speedway was largely used during the sleighing season, which continued for seven weeks. Soldiers' Field Road and the Speedway itself have both been resurfaced this year. The grade has been raised of the small pleasure ground for children, which was built on the former site of Fuller's Wharf, at the foot of Market Street in Brighton. Thirty-six swings and sixteen teeter boards have been installed, and the place is used by large numbers of children from the neighborhood. At the end of Charles River Road in Watertown the remaining buildings formerly belonging to the Walker Pratt Company have been torn down. Some forestry work and planting has been done, and considerable accomplished in suppression of the gypsy and brown-tail moth. At Lowell Memorial Park, which is a part of Fresh Pond Parkway,

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ornamental posts have been placed at the entrances and a low wall built along Brattle and Mount Auburn streets. These improvements have been made in co-operation with the Lowell Memorial Association, to whose efforts the acquisition of this land was largely due. Suitable tablets will be placed upon the posts as soon as they have been cast.

BEAVER BROOK DIVISION: ROBERT ELDER, *Superintendent.*

Considerable work was required this year to protect the oaks and other interesting tree growth of this reservation from the devastation of the brown-tail and gypsy moth, and it will be necessary the coming year to do even more extensive work of this kind. On account of the raising of the grade of Trapelo Road by the town of Belmont, the wall along this boundary has been built up to correspond with the change. This reservation continues to be visited by large numbers of picnickers during the summer. In winter the ponds are favorite resorts for skating.

NANTASKET BEACH RESERVATION: MOODY LEIGHTON, *Superintendent.*

There appears to have been a larger use of this reservation than for several years preceding, which is probably due to the establishment of amusement enterprises on adjacent lands. The weather was also favorable, as is shown by the increased use of the bath-house, which was opened on July 1 and closed on September 4. The total number of bathers was 30,097, and the largest number on one day 1,594, on July 4. The receipts for the season, including amount received from sale of steam to tenants, were $8,705.53, and the expenditures for the year $7,111.70. Some slight alterations in the line of convenience were made in the hotel buildings. An additional sanitary was built next to the bath-house. A bulkhead was constructed from the bath-house to the foot of Atlantic Hill, and the old pond formerly used by the Chutes filled up. Grading was carried along Nantasket Avenue in both directions from the hotel buildings, which in time will result in giving a much more pleasing appearance to the reservation. The hotel buildings have also been painted.

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3. Miscellaneous.

The Supreme Judicial Court in February appointed commissioners to determine and make award of the proportion in which the towns and cities of the Metropolitan Parks District should make payments during the next five years towards the interest, sinking fund and maintenance requirements of the Metropolitan Parks System, as required by chapter 419 of the Acts of the Legislature for the year 1899. The same commissioners were also appointed to perform a similar service in relation to the cost of Wellington Bridge, as required by chapter 491 of the Acts of the Legislature for the year 1901. The commissioners have filed their awards in both cases, and their reports have been approved by the court. The awards, together with such of the pleadings and decrees as are necessary for a proper understanding of them, are printed in the Appendix to this report. Under the provisions of chapter 457 of the Acts of the Legislature for the year 1905, the apportionment for this year has been made on the basis of the old apportionment; and in making the assessment for next year additions or deductions will be made in order to make the final result accord with the new apportionment.

4. Finances.

The following tables show in brief form the expenditures under the various park loans for the year ending Dec. 1, 1905: —

Metropolitan Parks Loan Fund.

Blue Hills Reservation: —		
Land,	$1,285 25	
Miscellaneous,	16,681 31	
		$17,966 56
Middlesex Fells Reservation: —		
Land,	$5,000 00	
Miscellaneous,	31,652 09	
		36,652 09
Revere Beach Reservation: —		
Miscellaneous,	$132,434 71	
		132,434 71

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Stony Brook Reservation: —		
Land,	$962 50	
Miscellaneous,	131 18	
		$1,093 68
Beaver Brook Reservation: —		
Miscellaneous,	$1,166 74	
		1,166 74
Hemlock Gorge Reservation: —		
Miscellaneous,	$164 39	
		164 39
Charles River Reservation: —		
Land,	$7,198 73	
Miscellaneous,	4,605 36	
		11,804 09
Neponset River Reservation: —		
Land,	$13,469 19	
Miscellaneous,	421 94	
		13,891 13
Mystic River Reservation: —		
Land,	$822 39	
Miscellaneous,	14,460 69	
		15,283 08
Lynn Shore Reservation: —		
Land,	$4,406 93	
Miscellaneous,	94,955 88	
		99,362 81
Quincy Shore Reservation: —		
Miscellaneous,	$18,845 72	
		18,845 72
Winthrop Shore Reservation: —		
Land,	$8,025 84	
Miscellaneous,	2,674 51	
		10,700 35
King's Beach Reservation: —		
Miscellaneous,	$70 60	
		70 60
Winthrop Parkway: —		
Land,	$15,196 50	
Miscellaneous,	708 33	
		15,904 83
Wellington Bridge: —		
Miscellaneous,	$4,578 59	
		4,578 59
Nahant Bath-house: —		
Miscellaneous,	$67,794 58	
		67,794 58
Boylston Street Bridge: —		
Miscellaneous,	$9,292 58	
		9,292 58
General expense,		6,007 02
		$463,013 55

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METROPOLITAN PARKS LOAN FUND, SERIES II.

Blue Hills Parkway: —		
Miscellaneous,	$28,873 18	
		$28,873 18
Middlesex Fells Parkway: —		
Land,	$4,108 75	
Miscellaneous,	8,722 58	
		12,831 33
Mystic Valley Parkway: —		
Land,	$1,000 00	
Miscellaneous,	24,697 22	
		25,697 22
Revere Beach Parkway: —		
Land,	$1,083 79	
Miscellaneous,	62,784 01	
		63,867 80
Neponset River Parkway: —		
Land,	$1,529 00	
Miscellaneous,	13,332 16	
		14,861 16
Fresh Pond Parkway: —		
Land,	$1,800 00	
Miscellaneous,	5,813 64	
		7,613 64
Furnace Brook Parkway: —		
Land,	$1,720 00	
Miscellaneous,	29,766 92	
		31,486 92
Nahant Beach Parkway: —		
Land,	$15,000 00	
Miscellaneous,	46,528 77	
		61,528 77
Charles River Speedway: —		
Miscellaneous,	$4,976 69	
		4,976 69
Blue Hills Roads: —		
Miscellaneous,	$713 45	
		713 45
Middlesex Fells Roads: —		
Miscellaneous,	$1,567 21	
		1,567 21
Lynnway: —		
Miscellaneous,	$34,141 17	
		34,141 17
Middlesex Fells and Lynn Woods: —		
Miscellaneous,	$2,576 71	
		2,576 71
Spy Pond Parkway: —		
Miscellaneous,	$2 17	
		2 17
General expense,		4,983 32
		$295,720 74

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The following tables show the total amount expended in each loan the cost of each reservation and parkway to Dec. 1, 1905, and the amounts charged by the Auditor's department to meet the sinking fund and interest requirements to Jan. 1, 1900: —

METROPOLITAN PARKS LOAN FUND.

Blue Hills Reservation: —		
Land,	$360,645 04	
Miscellaneous,	282,881 50	
		$643,526 54
Middlesex Fells Reservation: —		
Land,	$690,782 43	
Miscellaneous,	252,949 10	
		943,731 53
Revere Beach Reservation: —		
Land,	$1,162,747 67	
Miscellaneous,	744,596 88	
		1,907,344 55
Stony Brook Reservation: —		
Land,	$281,243 87	
Miscellaneous,	75,701 52	
		356,945 39
Beaver Brook Reservation: —		
Land,	$29,819 29	
Miscellaneous,	23,265 33	
		53,084 62
Hemlock Gorge Reservation: —		
Land,	$53,254 00	
Miscellaneous,	15,475 44	
		68,729 44
Charles River Reservation: —		
Land,	$1,475,647 55	
Miscellaneous,	251,567 95	
		1,727,215 50
Neponset River Reservation: —		
Land,	$220,680 37	
Miscellaneous,	46,054 09	
		266,734 46
Mystic River Reservation: —		
Land,	$236,981 87	
Miscellaneous,	50,311 20	
		287,293 07
Lynn Shore Reservation: —		
Land,	$231,424 94	
Miscellaneous,	142,012 35	
		373,437 29

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Quincy Shore Reservation: —		
Land,	$70,984 55	
Miscellaneous,	53,854 54	
		$124,839 09
Winthrop Shore Reservation: —		
Land,	$51,067 32	
Miscellaneous,	165,138 06	
		216,205 38
Hart's Hill Reservation: —		
Land,	$10,000 00	
Miscellaneous,	103 95	
		10,103 95
King's Beach Reservation: —		
Land,	$23,847 21	
Miscellaneous,	1,519 28	
		25,366 49
West Roxbury Parkway: —		
Land,	$244,976 01	
Miscellaneous,	8,313 67	
		253,289 68
Winthrop Parkway: —		
Land,	$15,196 50	
Miscellaneous,	780 80	
		15,977 30
Wellington Bridge: —		
Miscellaneous,	$184,952 88	
		184,952 88
Nahant Bath-house: —		
Miscellaneous,	$67,794 58	
		67,794 58
Boylston Street Bridge: —		
Miscellaneous,	$9,292 58	
		9,292 58
General expense,		147,639 95
		$7,683,504 27
Sinking fund requirements to 1896,	$18,980 18	
Care and maintenance to July 1, 1896,	85,813 46	
Care and maintenance, July 1, 1896, to Jan. 1, 1897,	19,604 06	
Sinking fund assessment for 1897,	63,630 70	
Sinking fund assessment for 1898,	9,755 55	
Sinking fund assessment for 1899,	64,224 00	
Interest,	28,318 61	
		290,326 56
Total charged to Dec. 1, 1905,		$7,973,830 83

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METROPOLITAN PARKS LOAN FUND, SERIES II.

Blue Hills Parkway: —		
Land,	$133,492 02	
Miscellaneous,	269,316 14	
		$402,808 16
Middlesex Fells Parkway: —		
Land,	$228,404 39	
Miscellaneous,	457,413 59	
		685,817 98
Mystic Valley Parkway: —		
Land,	$202,988 40	
Miscellaneous,	239,519 92	
		442,508 32
Revere Beach Parkway: —		
Land,	$536,852 35	
Miscellaneous,	831,435 72	
		1,368,288 07
Neponset River Parkway: —		
Land,	$46,531 60	
Miscellaneous,	34,289 73	
		80,821 33
Fresh Pond Parkway: —		
Land,	$44,086 25	
Miscellaneous,	28,027 58	
		72,113 83
Furnace Brook Parkway: —		
Land,	$137,337 49	
Miscellaneous,	46,756 25	
		184,093 74
Nahant Beach Parkway: —		
Land,	$80,940 78	
Miscellaneous,	50,577 98	
		131,518 76
Charles River Speedway: —		
Miscellaneous,	$521,317 46	
		521,317 46
Blue Hills Roads: —		
Miscellaneous,	$7,560 16	
		7,560 16
Middlesex Fells Roads: —		
Miscellaneous,	$47,704 53	
		47,704 53
Stony Brook Roads: —		
Miscellaneous,	$37,183 45	
		37,183 45

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Lynnway: —		
Land,	$20,500 00	
Miscellaneous,	98,513 31	
		$119,013 31
Middlesex Fells and Lynn Woods: —		
Miscellaneous,	$7,994 36	
		7,994 36
Spy Pond Parkway: —		
Miscellaneous,	$89 04	
		89 04
General expense,		92,717 49
		$4,201,549 99
Sinking fund requirement for 1896,	$3,650 03	
Sinking fund assessment for 1897,	14,057 10	
Sinking fund assessment for 1898,	3,765 08	
Sinking fund assessment for 1899,	15,396 00	
One-half interest,	22,327 68	
		59,195 89
Total charged to Dec. 1, 1905,		$4,260,745 88

NANTASKET BEACH LOAN.

Land,	$603,329 57	
Miscellaneous,	102,551 93	
Total charged to Dec. 1, 1905,		$705,881 50

The appropriations heretofore made are as follows: —

METROPOLITAN PARKS LOAN FUND.

Original appropriation, chapter 407, Acts of 1893,	$1,000,000 00
First Revere Beach Act, chapter 483, Acts of 1894,	500,000 00
Charles River Act, chapter 509, Acts of 1894,	300,000 00
Second Revere Beach Act, chapter 305, Acts of 1895,	500,000 00
General appropriation, chapter 466, Acts of 1896,	1,000,000 00
General appropriation, chapter 464, Acts of 1897,	500,000 00
General appropriation, chapter 530, Acts of 1898,	1,000,000 00
Revere Beach Bath-house Act, chapter 142, Acts of 1899,	125,000 00
General appropriation, chapter 396, Acts of 1899,	300,000 00
Charles River Improvement Act, chapter 465, Acts of 1900,	50,000 00
Fuller's Wharf Act, chapter 467, Acts of 1900,	30,000 00
General appropriation, chapter 445, Acts of 1901,	450,000 00
Mystic River Bridge Act, chapter 492, Acts of 1901,	200,000 00
General appropriation, chapter 290, Acts of 1903,	125,000 00
Newton Upper Falls Bridge Act, chapter 391, Acts of 1903,	40,000 00

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Continuing appropriation, chapter 429, Acts of 1903, for 1903,	$300,000 00
For 1904,	300,000 00
For 1905,	300,000 00
Nahant Beach Bath-house Act, chapter 326, Acts of 1904,	70,000 00
	$7,090,000 00
To provide for interest and sinking fund requirements to 1900, chapter 311, Acts of 1897,	900,000 00
Total amount of loans,	$7,990,000 00
Amounts received from sales of buildings, receipts from bath-house, fines, etc.,	198,334 01
Total,	$8,188,334 01
Total charged to loans,	7,973,830 83
Balance remaining in hands of State Treasurer,	$214,503 18

METROPOLITAN PARKS LOAN FUND, SERIES II.

Original boulevard, chapter 288, Acts of 1894,	$500,000 00
General appropriation, chapter 472, Acts of 1896,	500,000 00
General appropriation, chapter 521, Acts of 1897,	1,000,000 00
Saugus Bridge Act, chapter 547, Acts of 1898,	100,000 00
General appropriation, chapter 428, Acts of 1899,	500,000 00
Mattapan Bridge Act, chapter 443, Acts of 1900,	75,000 00
Winchester Act, chapter 444, Acts of 1900,	50,000 00
Revere Beach Parkway Act, chapter 445, Acts of 1900,	200,000 00
General appropriation, chapter 172, Acts of 1902,	450,000 00
General appropriation, chapter 359, Acts of 1903,	110,000 00
Continuing appropriation, chapter 419, Acts of 1903, for 1903,	300,000 00
For 1904,	300,000 00
For 1905,	300,000 00
	$4,385,000 00
To provide for interest and sinking fund requirements to 1900, chapter 311, Acts of 1897,	100,000 00
Total amount of loans,	$4,485,000 00
Receipts from sales, etc.,	29,907 41
Total,	$4,514,907 41
Total of amounts charged to loans,	4,260,745 88
Balance remaining in hands of State Treasurer,	$254,161 53

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NANTASKET BEACH LOAN.

Appropriation, chapter 464, Acts of 1899,	$600,000 00
Appropriation, chapter 456, Acts of 1901,	100,000 00
Total amount of loans,	$700,000 00
Receipts from rents, etc.,	5,881 50
Total,	$705,881 50
Total of amounts charged to loans,	705,881 50

Respectfully submitted,

JOHN WOODBURY,
Secretary.

DEC. 1, 1905.

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LYNN SHORE RESERVATION. — Sea wall, promenade and driveway.

REPORT OF THE LANDSCAPE ARCHITECTS.

Mr. W. B. de las Casas, *Chairman, Metropolitan Park Commission.*

Sir: — We beg to submit the following report for the year ending Nov. 30, 1905: —

The reservation which has required the greatest attention from this department during the year has again been the Middlesex Fells, on account of the critical state of the forest under the attacks of the gypsy and brown-tail moths. We have completed the general forest plan referred to in previous reports. In the direction of the brush cutting and tree cutting that has been done as a part of the work against the insects, we have used this plan as a guide, being careful to permit no cutting which would hamper the ultimate development of the woods in accordance with the plan, although in scarcely any cases has cutting been done merely for the sake of advancing the sylvan beauty of the reservation when not demanded by immediately pressing conditions. The effect of the plan has been to limit the localities and conditions where tree and brush cutting as a part of the insect fighting has seemed permissible.

During the winter of 1904–05 a considerable amount of tree cutting was done in badly infested sections, where the plan contemplated a relatively open wood; but in the major part of the reservation the plan calls for the close-wood type, and the tree cutting done more recently has included scarcely more than the dead, diseased and suppressed trees and specimens otherwise individually objectionable.

During the last fourteen weeks the principal work done under our direction has been a general removal of worthless and encumbering underbrush, to facilitate further operations against the insects throughout the reservation. None of the

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delicate lower ground cover, consisting of plants less than three feet high, has been removed at any point; and even the larger woodland shrubs have been generally preserved, together with all the young seedling trees, the "brush" consisting almost altogether of small and generally worthless sprouts from old tree stumps.

In the same reservation we have given further study to the perplexing question of how to locate the electric car line which is expected to follow the town road through the reservation from Fellsway West to Stoneham.

Along the Charles River plans have been made for the uncompleted links in the chain of drives extending from Watertown to Cambridge, where they will connect with the partly completed chain extending to the new Cambridge Bridge on the Basin.

We have been engaged with the Engineer and the Consulting Architect on the design of a number of important bridges required at various points. The practice in this matter has been to have preliminary studies prepared by us for the types of bridges appropriate to the several situations, to have these revised after repeated joint consultations between us and the Engineer and the Consulting Architect, and then to have the working drawings and specifications prepared by the Engineer.

The details of these and many other matters with which we have been concerned during the year are fully discussed in the reports of the departments of Engineering and Superintendence, with which we have been in consultation, and need not be further discussed by us here. The accompanying table gives a summary of the plans and reports prepared during the year.

Respectfully submitted,

OLMSTED BROTHERS.

Dec. 1, 1905.

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Summary of Reports and Plans (exclusive of Sun Prints) prepared by the Landscape Architects during the Year ending Nov. 30, 1905.

	Topographical Maps.	Studies.	Preliminary and General.	Grading and Construction Plans.	Planting and Forestry Plans.	Reports.	Totals.
Parkways.							
Blue Hills,	–	–	–	–	–	1	1
Fells Parkway,	1	3	2	–	1	3	10
Revere Beach,	–	–	–	–	2	1	3
Mystic Valley,	–	–	–	–	6	3	9
Fresh Pond,	–	–	–	2	1	4	7
Furnace Brook,	–	–	–	2	1	3	6
Nahant Beach,	–	2	1	–	2	1	6
Winchester — Woburn,	1	1	1	–	–	1	4
Reservations							
Blue Hills,	4	1	2	–	–	6	13
Fells Reservation,	2	10	3	2	11	10	38
Stony Brook,	–	–	–	–	–	1	1
Beaver Brook,	–	1	–	–	5	6	12
Hemlock Gorge,	–	–	–	3	–	1	4
Charles River,	1	15	10	–	–	6	32
Mystic River,	–	1	3	4	–	3	11
Lynn Shore,	–	1	1	–	–	–	2
Revere Beach,	–	–	–	–	–	1	1
Quincy Shore,	1	12	9	1	–	2	25
Nantasket Beach,	–	1	–	–	1	–	2
Totals,	10	48	32	14	30	53	187

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REPORT OF THE ENGINEER.

Hon. WILLIAM B. DE LAS CASAS, *Chairman, Metropolitan Park Commission.*

SIR: — I beg to submit the following report of the work of the Engineering Department for the year ending Dec. 1, 1905.

The number of employees of the department, which was 46 at the beginning of the year, was increased during the summer months to 54, and later reduced to the present force, which is 45. The present organization, in accordance with the ratings of the Civil Service Commission, is identical with that at the end of last year, less 1 inspector, and is as follows: 5 assistant engineers, 2 draftsmen, 8 instrument men in charge of parties, 23 rodmen, 5 inspectors, 1 clerk and 1 stenographer.

The construction work, under the supervision of Division Engineer C. Barton Pratt, has been during the past year principally grading, filling, surfacing, paving, drainage, river and shore work; also, there has been considerable stone, concrete and reinforced concrete masonry work in sea walls and bridges, and some steel bridge work.

The preliminary work, including surveys for construction plans, surveys and plans for takings, topographical surveys and maps, has been under the supervision of Division Engineer David A. Ambrose; and the general office work and preparation of plans under the supervision of Louis V. Foster.

Seventy-two permits and licenses have been issued by the Commission to cities, towns, corporations and individuals, for the work of construction of electric railways, electric light, telephone and telegraph lines, drains, sewers, water and gas pipes; and the general inspection of said work has been performed by this department, at a total cost of $721.22.

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During the past year records of the progress of the various pieces of construction work have been kept by means of photographs taken by this department.

The total cost of conducting the department has been as follows: —

Services,	$44,632 51
Equipment,	730 06
Operating expenses,	2,658 69
Total,	$48,021 26

The cost of construction work, done under the supervision of this department, has amounted to $464,470.23, exclusive of the cost of engineering and inspection; and all engineering and inspection incidental to the same, omitting travelling and other incidental expenses, has averaged 5.4 per cent.

An appraisal of the property in charge of the department, omitting the value of maps, plans, notes and records, is as follows: —

Equipment: —		
Offices,	$2,354 80	
Surveying and drawing instruments,	3,150 27	
Miscellaneous,	48 15	
		$5,553 22
Supplies: —		
General,		1,574 81
Total,		$7,128 03

Details are given in the following sections of parkway and reservation, and in the tables appended.

Parkways.

Blue Hills Parkway. — The road from Canton Avenue to Hillside Street in Blue Hills Reservation has been completed by the construction of the portion from Canton Avenue to Harland Street, and the grassed circle at the junction of the parkway and Canton Avenue has been removed and replaced by macadam, making the driveway of Canton Avenue crossing direct. The above work has been done by the reservation forces, and the engineering services have been furnished by this department.

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Fresh Pond Parkway. — An ornamental fence has been constructed, of granite, brick and limestone, around Lowell Memorial Park, the work being done in accordance with the design and under the supervision of the Architect. Grading, made necessary by the construction of this wall, has been done by the reservation forces; engineering services for the construction of the wall and for the grading have been furnished by this department.

Furnace Brook Parkway. — The work of building to sub-grade the parkway from Adams Street to Blue Hills Reservation, and building a reinforced concrete and stone masonry culvert bridge, under contract with Rowe & Perini, which was begun on Sept. 26, 1904, was completed Dec. 31, 1904. The total estimated cost of this work has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 81,	$4,221 40	
Engineering and inspection,	378 00	
		$4,599 40
Year ending Dec. 1, 1905: —		
Construction, contract No. 81,	$12,254 79	
Incidentals,	395 64	
Engineering and inspection,	928 48	
		13,578 91
Total,		$18,178 31

Construction plans and specifications have been prepared for a reinforced concrete and stone masonry bridge for the Granite Branch of the New York, New Haven & Hartford Railroad over Furnace Brook Parkway at West Quincy. The design is for an elliptical arch of 56-foot span and 31 feet in width. It is to be built of Portland cement concrete, reinforced by the "Johnson" corrugated bars, the facings of the arch and the spandrel and wing walls to be of quarry-faced granite ashler. The following bids were received on Aug. 21, 1905: —

Globe Construction Company, Boston,	$20,662 90
Patrick McGovern, Boston,	20,612 75
D. F. O'Connell Company, Boston,	20,267 25
John Cashman, Quincy,	19,860 50

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The contract was awarded to John Cashman. Before beginning this work it was necessary to construct a temporary embankment and pile bridge outside the line of the work, to provide for the operation of trains. Under an agreement with the railroad company, they were to construct the temporary embankments and pile bridge and the permanent approaches to the new masonry arch bridge, and to do the refilling and relay the permanent track over the new bridge when it is completed, the cost of said work to be paid by the Commonwealth. The following bids were received by the railroad company on Aug. 28, 1905, for building the pile bridge: —

Lawler Brothers, Charlestown,	$7,735 00
T. E. Ruggles, Boston,	7,145 00
Wm. L. Miller, Boston,	6,783 00
Cavanagh Brothers, Boston,	6,335 00
John Cashman, Quincy,	6,230 00

With the approval of this Commission the contract was awarded to John Cashman, and the work was begun on Sept. 7, 1905, and completed on Oct. 3, 1905. The work of constructing the new masonry arch bridge was begun on Oct. 3, 1905, and is now in progress. The main part of the bridge is practically completed excepting the easterly spandrel and wing walls, and it is expected to have the track laid in its permanent location over the new bridge on or before Dec. 31, 1905. On account of winter weather conditions it will probably be necessary to postpone until spring the construction of retaining walls for slopes, culvert and other incidental work. The estimated cost of the work, to Dec. 1, 1905, has been as follows: —

Construction, contract No. 91,	$14,706 25
Incidentals,	368 21
Engineering and inspection,	865 60
Total,	$15,940 06

Construction plans are being prepared for reinforced concrete masonry bridge for the main line of the New York, New Haven & Hartford Railroad over Furnace Brook Parkway, near Newport Avenue, Quincy.

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Lynn Fells Parkway. — Surveys and plans for takings, from Middlesex Fells Reservation to Elm Street, Melrose, have been made. Topographical surveys have been made of the portion from Elm Street, Melrose, to Lynn Woods, an area of about 265 acres.

Lynnway. — The work of constructing pile bridge and concrete masonry draw piers at Saugus River, under contract with the Metropolitan Contracting Company, which was begun on May 31, 1904, was completed on May 13, 1905. The total cost of this work has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 70,	$37,863 95	
Engineering and inspection,	1,510 60	
		$39,374 55
Year ending Dec. 1, 1905: —		
Construction, contract No. 70,	$11,260 08	
Incidentals,	872 45	
Engineering and inspection,	1,005 79	
		13,138 32
Total,		$52,512 87

The work of erecting the steel Scherzer rolling lift bridge for the draw, under contract with the American Bridge Company, was begun on Jan. 20, 1905, and was completed on Aug. 5, 1905. The total cost of this work, to Dec. 1, 1905, has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 74,	$1,043 85	
Engineering and inspection,	37 90	
		$1,081 75
Year ending Dec. 1, 1905: —		
Construction, contract No. 74,	$15,295 50	
Incidentals,	607 85	
Engineering and inspection,	574 10	
		16,477 45
Total,		$17,559 20

A proposition made by the Olds Gasoline Engine Company, for the furnishing and installation of gasoline engines and the necessary machinery to operate this bridge, has been accepted. As it is proposed to not open the bridge to public travel until next spring, on account of the incompletion

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HEMLOCK GORGE RESERVATION. — Boylston Street Bridge, from north side.

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of the approaches, it was deemed advisable to not install the engines and machinery until that time, and they have been delivered at the headquarters of Revere Beach Reservation and placed in storage. The cost to Dec. 1, 1905, has been, including engineering and inspection, $713.33.

The work of paving the roadway of the Saugus River Bridge with wooden blocks, furnished by the Commission under a contract with the United States Wood Preserving Company, has been completed by E. W. Everson & Co. as a part of the work under their contract for building Revere Beach Reservation and surfacing Lynnway. The work of surfacing Lynnway has been begun, but has been discontinued on account of winter weather, and will probably be completed early next spring. The estimated cost of this work, to Dec. 1, 1905, has been as follows: —

Construction, contract No. 83,	$3,276 62
Wooden block pavement,	5,748 75
Incidentals,	168 28
Engineering and inspection,	562 55
Total,	$9,756 20

Middlesex Fells Parkway. — The work of finishing the approaches to the Wellington Bridge and Middlesex Avenue from the bridge to Revere Beach Parkway, under contract with Coleman Brothers, was completed Nov. 19, 1904. The total cost of this work has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 78,	$12,358 82	
Engineering and inspection,	524 30	
		$12,883 12
Year ending Dec. 1, 1905: —		
Construction, contract No. 78,	$5,518 89	
Incidentals,	608 64	
Engineering and inspection,	303 20	
		6,430 73
Total,		$19,313 85

The work of building drawtender's house for Wellington Bridge, which was being done under an agreement with Lorenzo Hoyt, has been completed; and the total cost of

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the entire work, including cost of foundation for house, which was built by the Metropolitan Contracting Company, and including also engineering and inspection, has been $1,283.31.

Topographical surveys have been made along Forest Street from the present ending of the Parkway to Elm Street, covering an area of about 12 acres. Also, surveys have been made for takings for the extension of the Parkway to Elm Street.

Mystic Valley Parkway. — Construction plans and specifications have been prepared for building to sub-grade roadways along the Mystic River from High Street to Main Street, Medford, in the Mystic River Reservation. Bids for this work are given under the Mystic River Reservation section. The contract for the whole work was awarded to Coleman Brothers, the lowest bidders, and the work is practically completed from High Street to Jerome Street, which is the limit of the parkway section. The total estimated cost of this section, to Dec. 1, 1905, has been as follows : —

Construction, contract No. 85,	$26,432 05
Incidentals,	116 31
Engineering and inspection,	1,406 22
Total,	$27,954 58

Studies and construction plans for bridges for this section of the river are being prepared by this department.

Nahant Beach Parkway. — Construction plans and specifications for grading and building roads near the new bathhouse have been prepared, and the following bids were received on April 18, 1905 : —

M. McDonough, Swampscott,	$31,911 60
T. Stuart & Son Company, Newton,	30,893 50
Coleman Brothers, Everett,	29,093 75

The contract was awarded to Coleman Brothers, the work begun on April 24, 1905, and completed on Sept. 30, 1905. The total estimated cost, including work in addition to the amount in the original contract, has been as follows : —

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Construction, contract No. 89,	$41,539 23
Incidentals,	840 06
Engineering and inspection,	1,892 50
Total,	$44,271 79

Engineering services and supervision have been furnished by this department for the work of construction of an electric railway, by the Nahant & Lynn Street Railway Company, through the parkway from Washington Street, Lynn, to Castle Road, Nahant. The work of constructing the railway was begun April 19, 1905, and it was opened for public travel on July 20, 1905.

It was provided in the grant of location to the railway company that the wires and cables of the Lynn Gas and Electric Company, New England Telephone and Telegraph Company and Western Union Telegraph Company should be combined with the railway company's wires on one line of poles located between the track, and by so doing have only one line of poles, in place of four separate lines. This work of moving the wires to the new line of poles and removing the old poles is nearly complete, and the appearance of this section very much improved.

Neponset River Parkway. — The work of construction of the westerly roadway and street railway reservation from Brush Hill Road to Blue Hill Avenue, under contract with T. H. Gill & Co., has been completed. The total estimated cost of this work has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 80,	$10,483 60	
Engineering and inspection,	363 80	
		$10,847 40
Year ending Dec. 1, 1905: —		
Construction, contract No. 80,	$9,517 29	
Incidentals,	465 90	
Engineering and inspection,	674 20	
		10,657 39
Total,		$21,504 79

A double-track street railway has been built by the Blue Hills Street Railway Company on location granted by this Commission, from Blue Hill Avenue to Brush Hill Road,

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and across the Neponset River Reservation on pile trestle and embankment to Milton Street. This line has been in operation since May 1, 1905.

Revere Beach Parkway. — The work of constructing pile bridge and concrete masonry draw piers at Malden River, under contract with the Metropolitan Contracting Company, which was begun on June 28, 1904, was completed on April 12, 1905. The total estimated cost of the work under this contract has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 71,	$15,938 20	
Engineering and inspection, ...	774 20	
		$16,712 40
Year ending Dec. 1, 1905: —		
Construction, contract No. 71, . . .	$10,775 80	
Incidentals, ...	794 47	
Engineering and inspection, ...	816 80	
		12,387 07
Total, ...		$29,099 47

The work of erecting the steel Scherzer rolling lift bridge for the draw, under contract with the American Bridge Company, was begun on Jan. 14, 1905, and was completed May 15, 1905. The total estimated cost of the work under this contract, to Dec. 1, 1905, has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 74,	$1,043 79	
Engineering and inspection, ...	30 00	
		$1,073 79
Year ending Dec. 1, 1905: —		
Construction, contract No. 74, . . .	$16,191 90	
Incidentals, ...	682 49	
Engineering and inspection, ...	517 14	
		17,391 53
Total, ...		$18,465 32

The proposition made by the Olds Gasoline Engine Company, to furnish and install gasoline engines and the necessary machinery to operate this bridge, has been accepted; the work of installation was completed on Aug. 14, 1905, and the bridge has since been operated by this machinery,

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and it has proved very satisfactory and much more economical in this location than electricity, the usual method of operating these bridges. The total cost of the engines, machinery and pump installed has been $918.87, including engineering and inspection.

Construction plans and specifications for surfacing and other work incidental to the completion of the parkway from Main Street, Everett, to Fellsway, Medford, have been prepared. On April 3, 1905, the following bids were received for this work: —

James Driscoll & Son, Brookline,	$24,382 00
T. Stuart & Son Company, Newton,	20,353 00
The H. Gore Company, Boston,	20,178 50
Coleman Brothers, Everett,	19,692 00
James Doherty, Boston,	18,258 10
T. H. Gill & Co., Boston,	17,407 00

The contract was awarded to T. H. Gill & Co., the work was begun on April 10, 1905, and completed on July 31, 1905.

The amount of work done under some of the items of this contract was greater than that of the preliminary estimate, and the total estimated cost, according to vouchers in this office, has been as follows: —

Construction, contract No. 86,	$23,213 32
Wooden block pavement,	3,070 00
Loam and manure,	2,896 00
Lumber for fence,	1,833 28
Incidentals,	848 58
Engineering and inspection,	1,274 10
Total,	$33,135 28

The Welsbach system of lighting has been installed on this section of parkway, 29 single lamps being used, at about 200 feet average spacing.

Winthrop Parkway. — Surveys and plans have been made for conveyances and takings of the land in the portion of the parkway between Eliot Circle and Leverett Avenue, Revere.

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RESERVATIONS.

Blue Hills Reservation. — Engineering services have been furnished for the construction of a road from the end of Furnace Brook Parkway at the reservation line to Administration Road, a distance of about 1 mile. The work of construction is being done by the reservation forces, and is now in progress.

Charles River Reservation. — The work of construction of a concrete-steel gravity dam, of the Ambursen type, in the Charles River at Newton Lower Falls, which was begun Aug. 24, 1904, was completed Nov. 16, 1904. The total estimated cost of this work, a portion of which was paid by the R. T. Sullivan Company, who hold water rights at this point, has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 82,	$3,760 99	
Engineering and inspection,	374 60	
		$4,135 59
Year ending Dec. 1, 1905: —		
Construction, contract No. 82,	$3,595 55	
Incidentals,	2 40	
Engineering and inspection,	99 20	
		3,697 15
Total,		$7,832 74

Engineering services and supervision have been furnished for the construction of a walk along the westerly side of the Charles River from Cambridge Hospital to Arsenal Street, Cambridge. An opportunity was offered to obtain from the Hood Rubber Company, from grading on their property at Watertown, at an advantageous price, a portion of the filling material necessary for this work. Only about one-half of the material estimated to be furnished by them has been delivered to date.

On account of the rapid construction of Everett Street extension during the month of May, 1904, to allow its use during the summer months, no time was allowed for the settlement of the heavy fill of the portion nearest the Soldiers' Field Road, and consequently settlement has occurred since

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it was completed. In April, 1905, this portion was resurfaced and brought up to the established grade, the work being done by Coleman Brothers, the contractors for the original construction; and the total cost, according to vouchers in this office, has been $930.13, including engineering and inspection.

Construction plans and specifications have been prepared for a concrete and stone masonry dam and a reinforced concrete and stone masonry bridge over the Charles River at Boylston Street, Newton Upper Falls. The bridge consists of one 50-foot span arch and one 14-foot span arch, and is 70 feet wide between parapet walls. This provides for two 8-foot sidewalks and a roadway 54 feet wide, with the two tracks of the Boston & Worcester Street Railway Company located in the centre. The abutments, piers and 14-foot arch are constructed of plain Portland cement concrete, and the 50-foot arch of reinforced concrete. The entire faces of the bridge, including the arch rings, spandrel, wing and parapet walls, are constructed of quarry-split granite rubble masonry, this class of work being used to give a rustic appearance, to correspond to the surroundings. On Aug. 7, 1905, bids were received from the following: —

Atlas Reinforced Concrete Construction Company, Boston,	$34,947 50
Jones & Meehan, Boston,	32,266 00
T. H. Gill & Co., Boston,	31,154 25
Globe Construction Company, Boston,	30,683 08
Patrick McGovern, Boston,	29,700 50
Woodbury & Leighton Company, Boston,	25,901 25
M. McDonough, Swampscott,	25,464 00
T. E. Ruggles, Boston,	22,879 60

The lowest bidder, T. E. Ruggles, requested that his bid be not considered, as after making it he discovered that he had not fully informed himself regarding the conditions existing on this work, and had not consulted this department, and, after obtaining full information, thought that he would be unable to properly do the work. His request was granted by the Commission, and the contract was awarded to the next lowest bidder, M. McDonough. The work was

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begun on Aug. 21, 1905; the northerly half of the bridge was completed on Nov. 5, 1905, and the public travel turned from the old bridge on to it on this date. The street railway traffic was turned over on to the completed portion of the new bridge on Nov. 14, 1905. The work of tearing out the old timber bridge and constructing the southerly half of the new bridge was immediately begun; and such progress has been made that it now seems probable that the entire masonry work will be completed by Jan. 1, 1906, if the weather conditions remain favorable. The estimated cost of this work, to Dec. 1, 1905, according to vouchers in this office, has been as follows: —

Construction, contract No. 92,	$17,929 32
Incidentals,	790 98
Engineering and inspection,	1,539 12
Total,	$20,259 42

Lynn Shore Reservation. — The work of construction of sea wall from Red Rock, Lynn, to Monument Square, Swampscott, a total length of about 4,150 feet, and subgrading of the reservation, under contract with Coleman Brothers, has been completed; and it was decided by the Commission to extend the wall westerly around the Red Rock property, a distance of 632 feet. Construction plans were prepared and arrangements were made to do the work under an extension of the original contract, No. 76, with Coleman Brothers. The whole work under this contract, including extensions, was completed Aug. 31, 1905. The total estimated cost has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 76,	$43,410 82	
Engineering and inspection,	2,289 32	
		$45,700 14
Year ending Dec. 1, 1905: —		
Construction, contract No. 76,	$47,396 68	
Concrete piles,	2,581 00	
Incidentals,	2,860 04	
Engineering and inspection,	3,164 14	
		56,001 86
Total,		$101,702 00

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HEMLOCK GORGE RESERVATION. — Boylston Street Bridge, showing method of construction.

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The work of building iron pipe rail fence on the sea wall its entire length, the contract for which was awarded to A. B. Robbins in October, 1904, was completed Sept. 30, 1905. The portion on the extension of the wall around Red Rock was galvanized, to protect it from rust. The total cost of this work has been as follows: —

Construction, contract No. 84,	$6,156 87
Incidentals,	68 33
Engineering and inspection,	167 88
Total,	$6,393 08

Construction plans and specifications have been prepared for surfacing and other work necessary to complete the drive, promenade, etc., from Prescott Place, Lynn, to the northerly end of King's Beach Reservation in Swampscott. The lay-out of this work gives a granolithic promenade 15 feet wide along the top of the sea wall, a grassed slope of widths varying from 6 feet to 37 feet, a macadam roadway 40 feet wide, including a 3-foot concrete gutter, a planting space 6 feet wide and a gravel sidewalk 9 feet wide running along the land abutting the reservation. Bids were received for this work on April 17, 1905, from the following: —

Frank Williams & Co., Boston,	$43,446 60
Frederick D. Mayo, Lynn,	30,426 00
Daniel E. Lynch, Dorchester,	23,655 00
Falvey & Kelley, Dorchester,	22,807 50
David J. Sheehan & Co., Lynn,	22,672 20
M. McDonough, Swampscott,	21,865 00
Coleman Brothers, Everett,	21,207 75
The H. Gore Company, Boston,	20,119 90
James Doherty, Boston,	19,571 25

The contract was awarded to James Doherty, and the work was begun April 24, 1905, and was completed Sept. 15, 1905. Standpipes for watering carts and Welsbach lights have been installed, 20 lamp posts of special design, with 2 lamps on each post, being required. The total estimated cost of this work has been as follows: —

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Construction, contract No. 87,	$22,594 82
Incidentals,	1,150 86
Engineering and inspection,	2,143 07
Total,	$25,888 75

Surveys, plans and estimates have been made for the extension of the reservation from the end of the completed work near Prescott Place to Nahant Street.

Middlesex Fells Reservation. — Engineering services have been furnished for the construction of the Brooks Road. The work has been done by the reservation forces, and was completed Oct. 31, 1905.

Services were also furnished for the construction, by the reservation forces, of the north border road from Main Street to Bear Hill Entrance, and the work is now in progress.

Preliminary surveys have been made for road from Forest Street, at the end of Brooks Road, to Half-mile Road. Also, a topographical survey and plan of this section, an area of about 8.5 acres, have been made.

Mystic River Reservation. — The construction plans and specifications for building to sub-grade roads along the Mystic River from High Street, at Mystic Valley Parkway, to Main Street, Medford, have been completed; and on Dec. 27, 1904, bids were received from the following: —

Ruggles & Perkins, Boston,	$53,595 00
Gow & Palmer, Boston,	51,190 00
Frank Williams, Boston,	42,662 50
Rowe & Perini, South Framingham,	39,062 50
T. H. Gill & Co., Boston,	35,230 00
Coleman Brothers, Everett,	33,580 00

The contract was awarded to Coleman Brothers, preparations were made by them during the winter for doing the work, and the actual work was begun on April 3, 1905, and is now in progress.

It was provided in the specifications for this work that the filling material required for the work should be excavated or dredged from the river; and, as far as was necessary to obtain the required amount of material, the work should be

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done in accordance with the lines and grades for the widening, deepening and straightening of the channel recommended by Mr. John R. Freeman in his report on the feasibility of constructing a dam at Cradock Bridge. By this arrangement two results would be obtained by the amount of work usually required for either one alone. The estimated cost of the portion of the work from Jerome Street to Main Street, to Dec. 1, 1905, has been as follows: —

Construction, contract No. 85,	$13,361 80
Incidentals,	466 56
Engineering and inspection,	1,701 31
Total,	$15,529 67

Studies for designs of bridges for this section of the river are being prepared.

Nantasket Beach Reservation. — Engineering services and supervision have been furnished for building bulkhead at southerly end of the reservation, and for grading along County Road between the easterly line of the road and the buildings. The work has been done by the reservation forces, and the amount laid out to be done this year was completed Nov. 15, 1905.

Quincy Shore Reservation. — The work of building to sub-grade the portion of the reservation from Atlantic Street to Squantum Street, under contract with Coleman Brothers, was completed Nov. 30, 1904, and the total estimated cost has been as follows: —

Previously reported: —		
Construction and incidentals, contract No. 66,	$30,587 41	
Engineering and inspection,	804 01	
		$31,391 42
Year ending Dec. 1, 1905: —		
Construction, contract No. 66,	$7,888 06	
Incidentals,	6 10	
Engineering and inspection,	59 40	
		7,953 56
Total,		$39,344 98

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Construction plans and specifications have been prepared for building to sub-grade the portion of the reservation from Squantum Street to the National Sailors' Home, a distance of about 1½ miles, and for regrading the section from Atlantic Street to Squantum Street, which, during the interval of eight months between the two contracts, had settled considerably in places. Bids were received for this work on Aug. 21, 1905, from the following: —

T. E. Ruggles, Boston,	$220,200 00
Globe Construction Company, Boston,	139,525 00
Jones & Meehan, Boston,	137,700 00
Eastern Dredging Company, Boston,	120,100 00
Coleman Brothers, Boston,	104,900 00
William H. Ellis, Boston,	102,875 00
T. H. Gill & Co., Boston,	91,875 00
Rowe & Perini, South Framingham,	78,375 00
Newell & Snowling Construction Company, Uxbridge,	65,700 00

The contract was awarded to Newell & Snowling Construction Company, the work was begun Sept. 5, 1905, and is now in progress. The estimated cost, to Dec. 1, 1905, has been as follows: —

Construction, contract No. 93,	$7,731 68
Incidentals,	245 73
Engineering and inspection,	880 34
Total,	$8,857 75

Construction plans and specifications have been prepared for building a reinforced concrete masonry bridge over Sachem Brook, and for a reinforced concrete culvert near the southerly end of the work.

Revere Beach Reservation. — The work of constructing, of concrete, terraces and shelter foundations opposite Revere Street and Oak Island Street, under contract with Patrick McGovern, was completed June 30, 1905. The total estimated cost of this work has been as follows: —

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Previously reported: —		
Construction and incidentals, contract No. 77,	$17,462 42	
Engineering and inspection, ...	679 35	
		$18,141 77
Year ending Dec. 1, 1905: —		
Construction, contract No. 77, . . .	$17,474 88	
Incidentals, ...	835 18	
Engineering and inspection, ...	659 40	
		18,969 46
Total, ...		$37,111 23

The shelters have been erected on the above foundations, under the direction of the Architect.

A section of the granolithic walk just north of the bath-house was badly damaged by fire in the property abutting it, and it was necessary to remove the damaged portion and lay a new walk. About 466 square yards were laid to repair this damage, and the total cost was $545.90, including engineering and inspection.

Construction plans and specifications have been prepared for building, of concrete, tiers of seats or "bleachers" on the beach along the front of the terraces and shelters at the bath-house. This location has been much used by the public, on account of the shade from the structures behind; but, on account of its rough and stony condition, was both uncomfortable for the people to sit upon and was very difficult to keep clean on account of fragments of food, rubbish and paper getting in among the stones. The above-mentioned work provides for covering this area, which is about 500 feet long by 25 feet wide, with concrete, built in the form of steps 2 feet 6 inches wide by 6 inches high, with a smooth granolithic finished surface. This furnishes comfortable seating accommodations for about 1,500 people, and is easily cleaned each morning by sweeping, or flushing with water from a hose. On May 11, 1905, bids for the above-described work were received from the following: —

Carr & Andrews Corporation, Boston, . . .	$5,215 00
Murdock Corporation, Boston, ...	4,994 00
Warren Brothers Company, Boston, . . .	4,673 00
Patrick McGovern, Boston, ...	4,650 00

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The contract was awarded to Patrick McGovern, the work was begun on April 20, 1905, and was completed July 1, 1905. The total estimated cost of this work has been as follows: —

Construction, contract No. 90,	$5,050 45
Incidentals,	10 15
Engineering and inspection,	206 40
Total,	$5,267 00

The work of grading, surfacing and other work necessary to build complete the portion of the reservation from Revere Street to Northern Circle, near the Point of Pines, under contract with E. W. Everson & Co., has progressed very slowly, and is not yet completed. It will probably require two or three months of next spring to complete the work. The estimated cost of the work, to Dec. 1, 1905, has been as follows: —

Construction, contract No. 83,	$90,809 19
Incidentals,	1,591 12
Engineering and inspection,	3,629 25
Total,	$96,029 56

Surveys and plans have been made of the land between the taking line and the westerly line of construction, from Revere Street to Point of Pines, for conveyance to abutting owners.

General.

The bridges under the care and control of this Commission have been inspected by this department three times during the year, — November, 1904, May, 1905, and November, 1905, — and reports made to the Secretary of their condition.

Topographical surveys and maps have been made of a total area of 288 acres. Thirty-eight plans for record and 89 duplicate copies of record plans have been made during the year.

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The following tables are appended to this report : —

TABLE 1. Lengths of parkways.
TABLE 2. Summary of plan work.
TABLE 3. Summary of vouchers.
TABLE 4. Summary of cost of engineering.
TABLE 5. Prices for items of construction.

Respectfully submitted,

JOHN R. RABLIN,
Engineer.

DEC. 1, 1905.

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TABLE 1. — *Length of Parkways, corrected to Dec. 1, 1905.*

DESCRIPTION.	Constructed (Miles).	Under Construction (Miles).	Remainder (Miles).	Totals (Miles).
Blue Hills: Mattapan Square to Harland Street Entrance of Blue Hills Reservation, Boston and Milton, .	2.27	–	–	2.27
Fresh Pond: Mount Auburn Street to Huron Avenue, Cambridge, .	.52	–	–	.52
Furnace Brook: Merrymount Park to Blue Hills Reservation, Quincy,	–	2.33	1.00	3.33
Lynnway: Revere Beach Reservation to northerly side of Saugus River, Revere and Lynn, . .	–	.69	–	.69
Middlesex Fells: Broadway to Middlesex Fells Reservation, Somerville, Medford and Malden, . .	4.60	–	–	4.60
Mystic Valley: High Street to Middlesex Fells Reservation, Medford and Winchester, ...	2.90	–	–	2.90
Nahant Beach: Lynn Line at Washington Street to Spring Road, Nahant, ...	.25	–	1.98	2.23
Neponset River: junction of River Street and Damon Street to Blue Hills Reservation, ...	.53	–	1.71	2.24
Revere Beach: Revere Beach Reservation to Middlesex Fells Parkway and Mystic River Reservation, Revere, Chelsea, Everett and Medford, ...	5.24	–	–	5.24
Totals, ...	16.31	3.02	4.69	24.02

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TABLE 2. — *Summary of Maps and Plans prepared during the Year ending Dec. 1, 1905, omitting Blue and Other Prints.*

	Abandonments and Conveyances.	Construction.	Copies.	Entrances.	General.	Land and Settlement.	Restriction.	Takings, including Conveyances to Commonwealth.	Topographical.	Working Plans (Office).	Totals.
Parkways.											
Alewife Brook,	–	1	–	–	1	–	–	–	5	1	8
Blue Hills,	1	3	–	–	–	–	–	1	–	–	5
Fresh Pond,	2	4	1	–	2	–	–	1	–	–	10
Furnace Brook,	5	10	–	–	–	–	–	5	–	17	37
Lynn Fells,	–	–	–	–	–	–	–	3	–	3	6
Lynnway,	–	2	–	–	–	–	–	1	–	1	4
Middlesex Fells,	3	4	–	–	–	–	3	4	1	3	18
Mystic Valley,	2	1	–	–	–	–	5	5	–	2	15
Nahant Beach,	–	6	–	–	–	1	–	2	1	8	18
Neponset River,	–	–	–	–	–	1	–	1	–	3	5
Revere Beach,	7	5	–	1	1	–	–	8	–	25	47
Charles River Speedway,	–	–	–	–	–	–	–	1	–	–	1
Winthrop,	1	–	2	–	1	–	–	9	–	–	13
Totals,	21	36	3	1	5	2	8	41	7	63	187
Reservations.											
Blue Hills,	3	4	–	–	1	–	–	8	–	8	24
Charles River,	9	9	1	–	1	–	–	33	4	31	89
Hemlock Gorge,	–	–	1	–	–	–	–	–	–	1	2
King's Beach,	–	–	–	–	–	–	–	–	–	1	1
Lynn Shore,	7	11	–	–	1	–	–	–	–	63	82
Middlesex Fells,	2	8	–	–	2	1	–	7	1	6	27
Mystic River,	–	15	–	–	1	–	–	–	4	26	46
Neponset River,	4	1	–	–	–	1	–	5	–	–	11
Quincy Shore,	–	13	–	–	2	–	–	–	–	2	17
Revere Beach,	12	7	–	6	1	–	–	–	–	5	31
Stony Brook,	–	–	–	–	–	–	–	–	–	10	10
Winthrop Shore,	7	–	–	–	–	–	–	–	–	–	7
Totals,	44	68	2	6	9	2	–	53	9	153	346
Grand totals,	65	104	5	7	14	4	8	94	16	216	533

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TABLE 3.— *Summary of Vouchers of the Engineering Department, including, under Construction, the Entire Estimated Value of Work performed during the Year ending Dec. 1, 1905.*

	Construction.	Incidental to Engineering Department.									Grand Totals.
		Equipment.		Operating Expenses.							
		Offices.	Surveying and Drawing Instruments.	Engineering and Surveying.	Offices.	Repairs.	Supplies.	Travel.	Incidental Expenses.	Totals.	
General equipment,	-	$205 39	$524 67	-	-	-	-	-	-	$730 06	$730 06
General operating expenses,	-	-	-	$1,617 97	$20 12	$110 27	$614 04	$268 35	$27 94	2,658 69	2,658 69
Parkways.											
Blue Hills,	$220 96	-	-	279 80	-	-	-	95 28	19 60	394 68	615 64
Blue Hills Roads,	-	-	-	778 10	-	-	-	4 00	5 45	787 55	787 55
Fresh Pond,	-	-	-	249 18	-	-	-	-	9 10	258 28	258 28
Furnace Brook,	28,037 44	-	-	3,038 96	-	-	46 97	135 00	39 79	3,260 72	31,298 16
Lynn Fells,	-	-	-	2,083 94	-	-	-	126 25	56 69	2,266 88	2,266 88
Lynnway,	37,805 61	-	-	2,202 50	13 11	-	3 63	77 50	26 78	2,323 52	40,129 13
Middlesex Fells,	-	-	-	1,010 01	-	-	-	-	27 25	1,037 26	1,037 26
Middlesex Fells Roads,	-	-	-	603 83	-	-	-	9 76	4 20	617 79	617 79
Mystic Valley,	26,432 05	-	-	1,644 00	-	-	64 79	30 77	39 21	1,779 37	28,211 42
Nahant Beach,	42,192 73	-	-	2,417 86	30	-	12 50	138 00	49 86	2,618 52	44,811 25
Neponset River,	9,826 29	-	-	833 42	41 20	-	9 51	90 28	20 71	995 12	10,821 41
Revere Beach,	61,564 32	-	-	3,178 76	39 87	-	70 35	69 00	55 93	3,413 91	64,978 22
Speedway Section (Charles River),	1,031 43	-	-	243 40	-	-	-	-	13 83	257 23	1,288 66
Spy Pond,	-	-	-	2 17	-	-	-	-	-	2 17	2 17
Parkway totals,	$207,110 83	-	-	$18,566 53	$94 48	-	$207 75	$775 84	$368 40	$20,013 00	$227,123 83

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Reservations.											
Beaver Brook,	-	-	-	$15 50	-	-	-	-	$1 35	$16 85	$16 85
Blue Hills,	-	-	-	1,050 35	-	-	-	$7 50	13 22	1,071 07	1,071 07
Charles River,	$3,595 55	-	-	1,339 01	-	-	$23 75	-	33 51	1,396 27	4,991 82
Charles River (Boylston Street Bridge),	18,664 90	-	-	2,422 97	-	-	36 13	50 00	42 05	2,551 15	21,216 05
Hemlock Gorge,	-	-	-	7 50	-	-	-	-	1 85	9 35	9 35
King's Beach,	-	-	-	20 50	-	-	-	-	10	20 60	20 60
Lynn Shore,	82,183 39	-	-	7,061 94	$132 08	-	76 36	342 00	110 12	7,722 50	89,905 89
Middlesex Fells,	-	-	-	343 31	-	-	-	12 25	4 57	360 13	360 13
Mystic River,	13,860 59	-	-	3,226 01	24 73	-	56 28	89 00	84 49	3,480 51	17,341 10
Nantasket Beach,	-	-	-	165 67	-	-	80	-	-	166 47	166 47
Neponset River,	-	-	-	304 01	-	-	-	8 50	13 15	325 66	325 66
Quincy Shore,	15,741 54	-	-	1,994 95	11 00	-	84 25	74 88	31 86	2,196 94	17,938 48
Revere Beach,	116,001 29	-	-	5,353 71	36 90	-	18 96	152 50	82 32	5,644 39	121,645 68
Stony Brook,	-	-	-	47 70	-	-	-	-	2 25	49 95	49 95
Wellington Bridge (Middlesex Fells Parkway).	7,342 14	-	-	353 58	27 87	-	7 00	3 00	10 22	401 67	7,743 81
Winthrop Parkway,	-	-	-	645 50	-	-	-	20 00	1 10	666 60	666 60
Winthrop Shore,	-	-	-	95 80	-	-	-	-	2 10	97 90	97 90
Reservation totals,	$257,389 40	-	-	$24,448 01	$232 58	-	$303 53	$759 63	$434 26	$26,178 01	$283,567 41
Grand totals,	$464,500 23	$205 39	$524 67	$44,632 51	$347 18	$110 27	$1,125 32	$1,803 82	$830 60	$49,579 76	$514,079 99
Credit.											
General equipment,	-	$15 00	$36 50	-	-	-	-	-	-	$51 50	$51 50
General operating expenses,	-	-	-	-	-	-	$1 25	$28 65	-	29 90	29 90
Charles River,	$30 00	-	-	-	-	-	-	-	-	-	30 00
Total credit,	$30 00	$15 00	$36 50	-	-	-	$1 25	$28 65	-	$81 40	$111 40
Net expenditure,	$464,470 23	$190 39	$488 17	$44,632 51	$347 18	$110 27	$1,124 07	$1,775 17	$830 60	$49,498 36	$513,968 59

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TABLE 4. — *Summary of Engineering and Surveying.*

	Abandonments and Conveyances.	Boundaries, Plans, Staking and Monuments.	Construction, Incidental to.	Construction and Maintenance done by Other Departments, Incidental to.	Construction, Preliminary to.	(General).	Land and Boundaries, Surveys and Plans.	Permits.	Restrictions, Surveys and Plans.	Taking, preliminary to, and Actual.	Topographical.	Total.
Parkways.												
Blue Hills,	$15 90	-	-	$171 70	-	$7 50	-	$53 50	-	$1 20	-	$279 80
Blue Hills Roads,	-	-	-	164 10	$614 00	-	-	-	-	-	-	778 10
Fresh Pond,	9 30	-	-	218 35	-	-	$3 10	18 43	-	-	-	249 18
Furnace Brook,	31 90	$65 30	$1,794 08	23 20	1,053 63	3 00	-	23 15	-	39 70	-	3,033 96
Lynn Fells,	-	-	-	-	-	14 42	643 00	-	$11 60	332 02	$1,182 90	2,083 94
Lynnway,	-	-	2,155 77	-	44 03	-	-	-	-	2 70	-	2,202 50
Middlesex Fells,	9 40	13 20	-	83 10	28 35	46 80	73 80	99 25	5 00	651 68	-	1,010 01
Middlesex Fells Roads,	-	-	-	232 30	360 73	-	-	-	-	-	10 80	603 83
Mystic Valley,	8 35	-	1,406 22	77 70	-	6 50	43 60	23 48	10 90	67 85	-	1,644 60
Nahant Beach,	13 80	-	1,892 50	56 16	232 84	-	21 05	154 82	-	4 80	31 90	2,417 86
Neponset River,	3 00	13 60	674 20	-	-	18 12	64 80	29 20	5 80	24 70	-	833 42
Revere Beach,	29 60	12 60	2,708 54	66 50	239 47	11 70	3 00	55 45	-	52 90	-	3,178 76
Speedway Section (Charles River),	-	68 45	161 25	-	-	3 48	-	8 42	-	1 80	-	243 40
Spy Pond,	-	-	-	-	-	2 17	-	-	-	-	-	2 17
Parkway totals,	$121 25	$173 15	$10,792 56	$1,092 10	$2,573 08	$113 69	$751 85	$510 70	$33 30	$1,179 25	$1,225 60	$19,566 83

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Reservations.												
Beaver Brook,	-	-	-	$5 10	-	$8 90	-	-	-	-	$1 40	$15 50
Blue Hills,	$14 80	$2 70	-	-	-	114 85	$27 20	$5 05	$0 40	$368 25	20 50	1,050 35
Charles River,	73 80	1 50	$99 20	79 00	$536 81	7 20	47 50	35 40	6 40	452 20	-	1,539 01
Charles River (Boylston Street Bridge),	-	-	1,539 12	-	883 85	-	-	-	-	-	-	2,422 97
Hemlock Gorge,	-	-	-	-	-	4 50	-	3 00	-	-	-	7 50
King's Beach,	-	8 00	9 50	-	-	-	-	3 00	-	-	-	20 50
Lynn Shore,	27 08	49 00	5,482 79	10 00	1,367 20	64 10	13 70	12 07	-	-	36 00	7,061 94
Middlesex Fells,	2 40	70 63	-	-	-	58 58	7 20	1 50	-	203 00	-	343 31
Mystic River,	-	3 00	1,701 31	-	1,468 76	7 80	-	1 75	-	43 40	-	3,226 01
Nantasket Beach,	-	-	-	100 00	48 37	17 30	-	-	-	-	-	165 67
Neponset River,	110 93	8 40	-	-	10 08	3 50	16 50	123 30	-	31 30	-	304 01
Quincy Shore,	3 25	5 70	939 74	-	1,039 76	3 25	-	-	-	3 25	-	1,994 96
Revere Beach,	528 85	6 50	4,607 55	48 50	174 81	44 75	11 90	11 35	19 50	-	-	5,353 71
Stony Brook,	40	-	-	-	42 80	4 50	-	-	-	-	-	47 70
Wellington Bridge (Middlesex Fells Parkway),	-	-	328 20	-	25 38	-	-	-	-	-	-	353 58
Winthrop Parkway,	-	-	-	-	-	-	-	-	-	645 50	-	645 50
Winthrop Shore,	47 90	19 00	-	-	-	-	15 40	13 50	-	-	-	96 80
Reservation totals,	$809 41	$174 43	$14,607 41	$242 60	$5,597 81	$339 23	$139 40	$210 52	$26 30	$2,236 90	$64 00	$24,448 01
Miscellaneous,	-	-	-	-	-	1,617 97	-	-	-	-	-	1,617 97
Grand totals,	$809 66	$347 58	$25,309 97	$1,334 70	$8,170 89	$2,070 89	$891 25	$721 22	$59 60	$3,416 15	$1,289 60	$44,632 51

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TABLE 5.— *Prices paid for Principal Items of Construction.*

	PARKWAYS.							RESERVATIONS.								
	MIDDLESEX FELLS.	REVERE BEACH.		LYNN-WAY.	NEPONSET RIVER.	FURNACE BROOK.		NAHANT BEACH.	REVERE BEACH.		LYNN SHORE.			QUINCY SHORE.		CHARLES RIVER.	MYSTIC RIVER.
CONTRACT No. . . .	78.	71.	86.	70.	80.	81.	91.	89.	77.	83.	76.	84.	87.	66.	93.	92.	85.
Ballast.																	
Gravel ballast (cubic yards), .	-	$1 10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drains.																	
30-inch vitrified pipe (lineal foot).	-	-	-	-	$3 00	-	-	-	-	-	-	-	-	-	-	-	-
24-inch vitrified pipe (lineal foot).	-	-	-	-	-	$1 54	-	-	-	-	-	-	-	-	-	-	-
20-inch vitrified pipe (lineal foot).	-	-	-	-	-	1 10	-	-	-	-	-	-	-	-	-	-	-
18-inch vitrified pipe (lineal foot).	-	-	-	-	77	84	-	$1 00	-	-	-	-	-	-	-	-	$0 85
15-inch vitrified pipe (lineal foot).	-	-	$0 74	-	70	70	-	75	-	-	$0 75	-	-	-	-	-	70
12-inch vitrified pipe (lineal foot).	$0 50	-	62	-	-	53	-	50	-	$0 60	50	-	$0 40	-	-	-	50
10-inch vitrified pipe (lineal foot).	40	-	44	-	45	-	-	40	-	50	40	-	32	-	-	$1 00	40
8-inch vitrified pipe (lineal foot).	-	-	36	-	30	-	-	-	-	40	30	-	-	-	-	-	-
Edgestones.																	
Furnishing and setting, straight (lineal foot).	1 00	-	1 25	-	80	-	-	-	-	-	-	-	90	-	-	1 10	-
Furnishing and setting, curved (lineal foot).	1 25	-	-	-	1 00	-	-	-	-	-	-	-	1 40	-	-	-	-
Concrete (lineal foot), . .	-	-	-	-	-	-	$1 25	60	-	35	-	-	-	-	-	-	-

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TABLE 5. — *Prices paid for Principal Items of Construction.*

	PARKWAYS.							RESERVATIONS.								
	MIDDLESEX FELLS.	REVERE BEACH.		LYNN-WAY.	NEPONSET RIVER.	FURNACE BROOK.		NAHANT BEACH.	REVERE BEACH.		LYNN SHORE.			QUINCY SHORE.		CHARLES RIVER.	MYSTIC RIVER.
CONTRACT No. . . .	78.	71.	86.	70.	80.	81.	91.	89.	77.	83.	76.	84.	87.	66.	93.	92.	85.
Ballast.																	
Gravel ballast (cubic yards), .	-	$1 10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drains.																	
30-inch vitrified pipe (lineal foot).	-	-	-	-	$3 00	-	-	-	-	-	-	-	-	-	-	-	-
24-inch vitrified pipe (lineal foot).	-	-	-	-	-	$1 54	-	-	-	-	-	-	-	-	-	-	-
20-inch vitrified pipe (lineal foot).	-	-	-	-	-	1 10	-	-	-	-	-	-	-	-	-	-	-
18-inch vitrified pipe (lineal foot).	-	-	-	-	77	84	-	$1 00	-	-	-	-	-	-	-	-	$0 85
15-inch vitrified pipe (lineal foot).	-	-	$0 74	-	70	70	-	75	-	-	$0 75	-	-	-	-	-	70
12-inch vitrified pipe (lineal foot).	$0 50	-	62	-	-	53	-	50	-	$0 60	50	-	$0 40	-	-	-	50
10-inch vitrified pipe (lineal foot).	40	-	44	-	45	-	-	40	-	50	40	-	32	-	-	$1 00	40
8-inch vitrified pipe (lineal foot).	-	-	36	-	30	-	-	-	-	40	30	-	-	-	-	-	-
Edgestones.																	
Furnishing and setting, straight (lineal foot).	1 00	-	1 25	-	80	-	-	-	-	-	-	-	90	-	-	1 10	-
Furnishing and setting, curved (lineal foot).	1 25	-	-	-	1 00	-	-	-	-	-	-	-	1 40	-	-	-	-
Concrete (lineal foot), . .	-	-	-	-	-	-	$1 25	60	-	35	-	-	-	-	-	-	-

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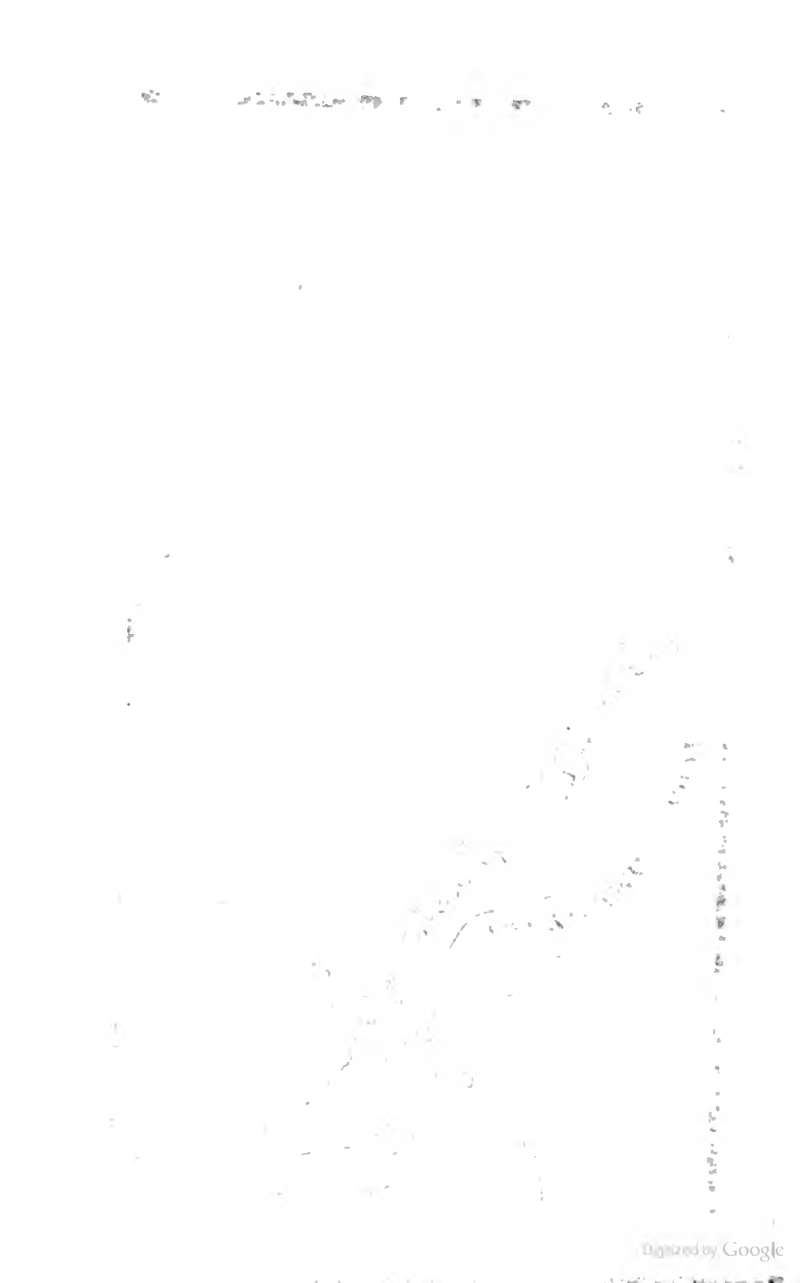
TABLE 5. — *Prices paid for Principal Items of Construction* — Concluded.

	PARKWAYS.								RESERVATIONS.								
	MIDDLESEX FELLS.	REVERE BEACH.		LYNN-WAY.	NEPONSET RIVER.	FURNACE BROOK.		NAHANT BEACH.	REVERE BEACH.		LYNN SHORE.			QUINCY SHORE		CHARLES RIVER.	MYSTIC RIVER.
CONTRACT No. . . .	78.	71.	86.	70.	80.	81.	91.	89.	77.	83.	76.	84.	87.	66.	93.	92.	85.
Spruce Piles (in Place).																	
Length 26 to 30 feet inclusive, .	-	$4 00	-	$5 00	-	-	-	-	-	-	$3 00	-	-	-	-	-	-
Surfacing.																	
Gravel, roadway (square yard),	-	-	-	-	$0 30	-	-	$0 20	-	-	-	-	-	-	-	$0 40	-
Broken stone, roadway (square yard)	$0 42	-	$0 44	-	-	-	-	45	-	$0 45	-	-	$0 395	-	-	50	-
Gravel walk (square yard), .	25	-	25	-	20	-	-	30	-	30	-	-	18	-	-	40	-
Loam (cubic yard), . . .	-	-	24	-	20	-	-	-	-	-	-	-	25	-	-	-	-
Loam, including furnishing (cubic yard).	1 00	-	1 35	-	90	-	$1 25	1 50	-	1 50	-	-	1 07	-	-	1 50	-
Surfacing gravel (cubic yard),	-	-	-	-	-	-	-	1 25	-	1 00	-	-	-	-	-	-	-
Granolithic sidewalk (square yard).	-	-	-	-	-	-	2 50	1 25	-	-	-	-	1 12	-	-	-	-
Fences.																	
Iron pipe rail (lineal foot), .	-	-	-	-	-	-	-	-	-	-	-	$1 14	-	-	-	-	-
Wood two rail (lineal foot), .	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Concrete catch-basins (each),	-	-	29 00	-	-	-	-	28 00	-	-	-	-	24 00	-	-	-	-
Tar felt waterproofing (square yard).	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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FINANCIAL STATEMENT.

DEC. 1, 1904, TO DEC. 1, 1905.

Metropolitan Parks Loan Fund,	$7,990,000 00
Receipts from bath-house, sales, etc.,	198,334 01
	$8,188,334 01

Expenditures.

Blue Hills Reservation: —				
Land,			$1,285 25	
Construction: —				
Contracts: —				
J. F. Stone, headquarters,	$5,897 36			
Arthur H. Tucker, refectory,	2,507 00			
		$8,404 36		
Labor and materials,		3,805 82		
			12,210 18	
Engineering: —				
Pay rolls,		$1,036 55		
Expenses,		20 72		
			1,057 27	
Landscape Architects: —				
Services,		$865 36		
Expenses,		37 09		
			902 45	
Legal,			568 00	
Claims,			142 00	
Architects' services,			432 64	
Headquarters, furnishings and fittings,			951 55	
Repairs of buildings,			371 37	
Sanitary, labor and signs,			47 85	
				$17,966 56
Middlesex Fells Reservation: —				
Land,			$5,000 00	
Construction, labor and materials,			26,812 51	
Engineering: —				
Pay rolls,		$280 88		
Expenses,		13 07		
			293 95	
Landscape Architects: —				
Services,		$4,307 70		
Expenses,		216 08		
			4,523 78	
Legal,			21 85	
				36,652 09
Amounts carried forward,				$54,618 65 $8,188,334 01

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Amounts brought forward,				$54,618 65	$8,188,334 01
Revere Beach Reservation: —					
Construction: —					
Contracts: —					
E. W. Everson & Co., grading, etc.,	$76,839 81				
Patrick McGovern, shelter foundations,	20,078 13				
G. W. & F. Smith Iron Co., iron and steel work, shelters,	6,930 72				
John Y. Mainland, carpenter work, shelters,	5,598 00				
Patrick McGovern, granolithic seats,	5,050 45				
G. W. & F. Smith Iron Co., electric light posts,	1,575 00				
H. P. Cummings Co., sanitary repairs,	598 00				
		$116,670 11			
Labor and materials,		1,881 61			
			$118,551 72		
Engineering: —					
Pay rolls,		$4,989 96			
Expenses,		373 62			
			5,363 58		
Legal,			77 70		
Claims,			150 00		
Town of Revere, changes in water main,			3,000 00		
Conduit for electric lighting wires,			2,018 98		
One-half cost of automobile truck,			1,208 40		
Architects' services, shelters and sanitary,			931 88		
Park settees,			480 00		
Watering cart,			352 45		
Drinking fountains for shelters,			800 00		
				132,434 71	
Stony Brook Reservation: —					
Land,			$902 50		
Engineering: —					
Pay rolls,		$47 30			
Expenses,		2 25			
			49 55		
Landscape Architects, services,			25 00		
Legal,			56 63		
				1,033 68	
Beaver Brook Reservation: —					
Construction, labor and materials,			$846 35		
Engineering: —					
Pay rolls,		$15 50			
Expenses,		1 35			
			16 85		
Amounts carried forward,			$863 20	$188,147 04	$8,188,334 01

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Amounts brought forward,		$863 20	$188,147 04	$8,188,334 01
Landscape Architects: —				
Services,	$295 13			
Expenses,	8 41			
		303 54		
			1,166 74	
Hemlock Gorge Reservation: —				
Engineering: —				
Pay rolls,	$7 50			
Expenses,	1 85			
		$9 35		
Landscape Architects: —				
Services,	$153 04			
Expenses,	2 00			
		155 04		
			164 39	
Charles River Reservation: —				
Land,		$7,198 73		
Construction: —				
Contract, Ambursen Hydraulic Construction Co., Finlay mill dam,	$1,025 41			
Labor and materials,	979 21			
		2,004 62		
Engineering: —				
Pay rolls,	$1,504 67			
Expenses,	118 88			
		1,623 55		
Landscape Architects: —				
Services,	$655 42			
Expenses,	16 19			
		671 61		
Legal,		136 20		
Claims,		100 00		
Advertising contracts,		69 38		
			11,804 09	
Neponset River Reservation: —				
Land,		$13,469 19		
Engineering: —				
Pay rolls,	$216 91			
Expenses,	21 40			
		238 31		
Legal,		33 63		
Land experts,		150 00		
			13,891 13	
Mystic River Reservation: —				
Land,		$822 39		
Construction, contract, Coleman Bros., Jerome Street to Main Street,		8,144 02		
Engineering: —				
Pay rolls,	$2,858 04			
Expenses,	762 99			
		3,621 03		
Landscape Architects: —				
Services,	$630 38			
Expenses,	24 30			
		654 68		
Land experts,		315 00		
Printing Mystic River improvement report,		1,601 47		
Advertising contracts,		124 49		
			15,283 08	
Amounts carried forwar		$230,456 47	$8,188,334 01	

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Amounts brought forward,				$230,456 47	$8,188,334 01
Lynn Shore Reservation: —					
Land,			$4,406 98		
Construction: —					
Contracts: —					
Coleman Bros., sea wall and grading,	$53,572 23				
James Doherty, grading and surfacing,	22,594 82				
Gow & Palmer, concrete piles,	2,561 00				
Alpheus B. Robbins, iron fence,	5,233 34				
Aberthaw Construction Co., steel for wall,	820 57				
		$84,801 96			
Labor and materials,		1,708 86			
			86,510 82		
Engineering: —					
Pay rolls,		$6,840 39			
Expenses,		777 40			
			7,617 79		
Landscape Architects: —					
Services,		$303 24			
Expenses,		4 88			
			308 12		
Legal,			22 05		
Watering cart,			352 45		
Advertising contracts,			144 65		
				99,362 81	
Quincy Shore Reservation: —					
Construction: —					
Contracts: —					
Coleman Bros., grading, Atlantic Street to Squantum Street,	$12,457 84				
Newell & Snowling Construction Co., grading,	3,451 42				
		$15,909 26			
Labor and materials,		81 05			
			$15,990 31		
Engineering: —					
Pay rolls,		$1,695 88			
Expenses,		211 07			
			1,906 95		
Landscape Architects: —					
Services,		$740 16			
Expenses,		68 88			
			809 04		
Legal,			2 63		
Land experts,			50 00		
Advertising contracts,			86 79		
				18,845 72	
Amounts carried forward,				$348,665 00	$8,188,334 01

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Amounts brought forward,			$348,665 00	$8,188,334 01
Winthrop Shore Reservation: —				
Land,		$8,025 84		
Construction, labor and materials,		729 91		
Engineering: —				
Pay rolls,	$88 60			
Expenses,	2 10			
		90 70		
Legal,		6 90		
Land experts,		1,847 00		
			10,700 35	
King's Beach Reservation: —				
Engineering: —				
Pay rolls,	$20 50			
Expenses,	10			
		$20 60		
Landscape Architects, services,		50 00		
			70 60	
Winthrop Parkway: —				
Land,		$15,196 50		
Engineering: —				
Pay rolls,	$446 90			
Expenses,	24 50			
		471 40		
Landscape Architects: —				
Services,	$230 30			
Expenses,	6 63			
		236 93		
			15,904 83	
Wellington Bridge: —				
Construction, labor and materials,		$1,092 15		
Engineering: —				
Pay rolls,	$353 58			
Expenses,	48 00			
		401 67		
Drawtenders,		448 00		
Power for draw,		500 00		
Lighting,		291 83		
Drawtender's house foundations,		1,274 71		
Drawtender's house repairs,		279 93		
Loam,		133 80		
Boats, etc.,		88 00		
Telephones,		81 49		
Tool house,		17 05		
Miscellaneous,		19 96		
			4,578 59	
Nahant Beach Bath-house: —				
Construction, contract, H. P. Cummings Co., building,		$59,941 83		
Architects' services and plans,		3,085 03		
Cutting artificial stone,		500 00		
Extractor motor driver,		600 00		
Furnishings,		776 05		
Valuable envelopes,		350 79		
Towels,		337 50		
Supplies,		213 40		
Fire alarm,		144 69		
Tickets,		140 75		
Amounts carried forward,		$66,090 04	$379,919 37	$8,188,334 01

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Amounts brought forward,	$66,090 04	$379,919 37	$8,188,334 01
Turnstiles and cancelling machine,	140 00		
Mirrors and frames,	163 50		
Fire extinguishers,	137 75		
Wiring, arc lights,	125 00		
Hardware,	121 00		
Baskets,	109 85		
Corrugated matting,	99 00		
Cash register,	96 10		
Hose,	87 35		
Stockings,	82 50		
Engine room supplies,	75 96		
Safe,	50 00		
Rubber key bands,	48 40		
Rubbish barrels,	44 40		
Rubber caps,	42 00		
Disinfectant,	40 15		
Rings and snaps,	34 73		
Stationery,	33 80		
Brass railings,	30 00		
Flags,	25 30		
Plumbing,	25 00		
Boat and oars,	21 50		
Wringers,	20 00		
Money bags,	17 00		
Window guards,	10 88		
Brass checks,	10 00		
Badges,	6 87		
Hair brushes,	6 50		
		67,794 58	
Boylston Street Bridge: —			
Construction, contract, Michael McDonough, bridge,	$7,021 70		
Engineering: —			
Pay rolls, $1,500 70			
Expenses, 182 86			
	1,683 56		
Wheelwright & Haven, architects,	546 88		
Advertising, contracts,	40 44		
		9,292 58	
General expense: —			
Engineering: —			
Pay rolls, $706 37			
Expenses, 999 84			
	$1,706 23		
Legal,	2,002 38		
Claims,	1,541 67		
Expenses Apportionment Commission,	666 76		
Travelling,	89 98		
		6,007 02	
		$463,013 55	
Amounts charged to Dec. 1, 1904,		7,510,817 28	
			7,973,830 83
Balance in hands of State Treasurer,			$214,503 18

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Metropolitan Parks Loan Fund, Series II.,	$4,485,000 00
Receipts from sales, etc.,	29,907 41
	$4,514,907 41

Expenditures.

Blue Hills Parkway: —				
Construction, labor and materials (extension),		$28,473 32		
Engineering: —				
Pay rolls,	$276 30			
Expenses,	113 38			
		389 68		
Landscape Architects, services,		10 18		
			$28,873 18	
Middlesex Fells Parkway: —				
Land,		$4,108 75		
Construction, contract, Coleman Bros., Middlesex Avenue to Revere Beach Parkway,		7,311 27		
Engineering: —				
Pay rolls,	$959 33			
Expenses,	26 80			
		986 13		
Landscape Architects: —				
Services,	$211 92			
Expenses,	16 56			
		228 48		
Legal,		21 70		
Claims,		175 00		
			12,831 33	
Mystic Valley Parkway: —				
Land,		$1,000 00		
Construction: —				
Contract, Coleman Bros., grading, etc.,	$21,352 90			
Labor and materials,	1,166 29			
		22,519 19		
Engineering: —				
Pay rolls,	$1,451 05			
Expenses,	133 43			
		1,584 48		
Landscape Architects: —				
Services,	$110 12			
Expenses,	28 41			
		138 53		
Legal,		97 67		
Land experts,		357 35		
			25,697 22	
Revere Beach Parkway: —				
Land,		$1,083 79		
Construction: —				
Contracts: —				
T. Stuart & Son, grading and surfacing Main Street, Everett, to Fellsway,	$24,354 32			
American Bridge Co., superstructure, Malden River Bridge,	13,763 11			
Metropolitan Contracting Co., bridge abutments,	9,159 42			
Am'ts car'd for'd,	$47,276 85	$1,083 79	$67,401 73	$4,514,907 41

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Am'ts brо't for'd,	$47,276 85		$1,083 79	$67,401 73	$4,514,907 41
Construction — *Con.*					
Contracts — *Con.*					
U. S. Wood Preserving Co., wooden paving blocks,	3,070 00				
Scherzer Rolling Lift Bridge Co., draw,	500 00				
Wm. H. Graham, drawtender's house,	602 50				
		$51,449 35			
Labor and materials,		6,029 94			
			57,479 29		
Engineering: —					
Pay rolls,		$3,161 97			
Expenses,		350 04			
			3,512 01		
Landscape Architects: —					
Services,		$84 28			
Expenses,		3 55			
			87 83		
Legal,			4 40		
Land experts,			420 00		
Watering cart,			400 00		
Footbridge, Mill Creek,			200 00		
Advertising contracts,			154 53		
Stone dust,			372 80		
Boat and davits,			114 65		
Miscellaneous,			39 00		
				63,867 80	
Neponset River Parkway: —					
Land,			$1,529 00		
Construction: —					
Contract, T. H. Gill & Co., Brush Hill Road to Blue Hill Ave.,		$11,082 80			
Labor and materials,		552 89			
			11,635 69		
Engineering: —					
Pay rolls,		$810 82			
Expenses,		120 50			
			931 32		
Landscape Architects, services,			25 00		
Legal,			233 70		
Land experts,			135 00		
Watering cart,			371 45		
				14,861 16	
Fresh Pond Parkway: —					
Land,			$1,800 00		
Construction, contract, W. A. & H. A. Root, fence, Lowell Memorial Park,			5,064 30		
Engineering: —					
Pay rolls,		$195 20			
Expenses,		4 75			
			199 95		
Landscape Architects: —					
Services,		$165 94			
Expenses,		2 50			
			168 44		
Legal,			18 05		
Architects,			297 90		
Miscellaneous,			65 00		
				7,613 64	
Amounts carried forward,			$153,744 33		$4,514,907 41

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Amounts brought forward,				$153,744 33	$4,514,907 41
Furnace Brook Parkway: —					
Land,			$1,720 00		
Construction: —					
Contracts: —					
Rowe & Perini, Adams Street to Blue Hills Reservation,	$13,038 60				
John Cashman, Granite Branch Bridge,	3,736 81				
		$16,775 41			
Labor and materials,		8,809 59			
			25,585 00		
Engineering: —					
Pay rolls,		$2,676 48			
Expenses,		255 33			
			2,931 81		
Landscape Architects: —					
Services,		$382 26			
Expenses,		7 49			
			389 75		
Wheelwright & Haven, architects,			788 64		
Legal,			71 72		
				31,486 92	
Nahant Beach Parkway: —					
Land,			$15,000 00		
Construction: —					
Contract, Coleman Bros., surfacing, etc.,		$41,539 23			
Labor and materials,		626 85			
			42,166 08		
Engineering: —					
Pay rolls,		$2,398 59			
Expenses,		203 73			
			2,602 32		
Landscape Architects: —					
Services,		$95 17			
Expenses,		2 77			
			95 17		
Claims,			130 00		
One-half cost of automobile truck,			1,208 40		
Planting,			300 00		
Lighting,			25 00		
Advertising contract,			1 80		
				61,528 77	
Charles River Speedway: —					
Construction: —					
Contract, Coleman Bros., playground,		$2,964 05			
Labor and materials,		1,087 00			
			$4,051 05		
Engineering: —					
Pay rolls,		$183 28			
Expenses,		76 83			
			260 11		
Heater, headquarters,			466 00		
Swings, seats, etc., playground,			169 53		
Shelter,			30 00		
				4,976 69	
Amounts carried forward,				$251,736 71	$4,514,907 41

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Amounts brought forward,			$251,736 71	$4,514,907 41
Blue Hills Roads: —				
Engineering: —				
Pay rolls,	$704 00			
Expenses,	9 45			
		$713 45		
			713 45	
Middlesex Fells Roads: —				
Construction, labor and materials,		$981 25		
Engineering: —				
Pay rolls,	$572 00			
Expenses,	13 96			
		585 96		
			1,567 21	
Lynnway: —				
Construction: —				
Contracts: —				
American Bridge Co., superstructure, Saugus River Bridge,	$13,001 17			
Metropolitan Contracting Co., bridge abutments,	9,571 07			
U. S. Wood Preserving Co., wooden paving blocks,	5,748 75			
Scherzer Rolling Lift Bridge Co., draw,	500 00			
Wm. H. Graham, drawtender's house,	602 50			
E. W. Everson & Co., grading, surfacing, etc.,	1,263 63			
	30,687 12			
Labor and materials,	967 76			
		$31,654 88		
Engineering: —				
Pay rolls,	$2,012 42			
Expenses,	182 70			
		2,195 12		
Boats and davits,		114 65		
Steps to float,		85 00		
Miscellaneous,		79 02		
Architects,		12 50		
			34,141 17	
Lynn Fells Parkway: —				
Engineering: —				
Pay rolls,	$2,068 77			
Expenses,	182 94			
		$2,251 71		
Landscape Architects, services,		25 00		
Claims,		300 00		
			2,576 71	
Spy Pond Parkway: —				
Engineering, pay roll,		$2 17		
			2 17	
Amounts carried forward,			$290,737 42	$4,514,907 41

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Amounts brought forward,		$290,737 42	$4,514,907 41
General expense: —			
Engineering: —			
Pay rolls,	$737 68		
Expenses,	611 35		
	$1,349 03		
Landscape Architects: —			
Services,	$130 32		
Expenses,	8 36		
	138 68		
Legal,	2,768 79		
Claims,	726 82		
		4,983 32	
		$295,720 74	
Amount charged to Dec. 1, 1904,		3,965,025 14	
			4,260,745 88
Balance in hands of State Treasurer,			$254,161 53

Metropolitan Parks System Maintenance.

Appropriation for 1905,	$185,415 00

Expenditures.

General expense: —		
Police: —		
Pay rolls,	$46,303 18	
Uniforms and equipment,	4,648 99	
	$50,952 17	
Travelling,	364 90	
Salaries,	10,425 00	
Rent,	2,413 88	
Stationery,	913 65	
Maps and books,	568 93	
Telephones,	590 72	
Annual report,	1,229 27	
Extra clerical assistance,	220 47	
Postage, etc.,	270 17	
Advertising rules,	109 64	
Photographs and slides,	85 87	
Rent of typewriter,	27 50	
Towel supply,	24 40	
Typewriter repairs,	25 10	
Card cabinet,	35 00	
Report on zoölogical garden,	18 00	
Social law library,	20 00	
Rubber stamps,	11 20	
Fountain pens,	10 00	
Brooms, dusters, etc.,	11 24	
Spring water,	8 25	
Account books,	8 75	
Cleaning carpet,	8 04	
Motor bicycle licenses,	8 00	
Desk lamp,	4 65	
Office repairs,	6 60	
Frames,	5 00	
Repairing clock,	3 50	
Sharpening erasers, etc.,	1 25	
Chair,	1 50	
Amounts carried forward,	$68,382 65	$185,415 00

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Amounts brought forward,		$68,382 65	$185,415 00
Rug,		5 00	
Bronze bolts,		2 00	
Miscellaneous,		6 85	
			$68,396 50
Blue Hills Reservation:—			
Labor,	$15,837 19		
Teaming,	321 25		
Keep of horses,	2,129 33		
		$18,287 77	
Travelling,		3 90	
General supplies,		2,342 25	
Horses, carriages, etc.,		559 18	
Telephones,		471 33	
Repairs,		243 18	
Tool house,		1,500 00	
Water rates,		212 12	
Lighting office,		138 29	
Hydrants,		132 85	
Express,		76 93	
Johnson pump,		62 46	
Pumps,		57 00	
Laundry,		35 45	
Clock,		18 00	
Furnishings, headquarters,		39 81	
Duck suits,		9 00	
Letterpress stand,		8 00	
Money bag,		8 00	
Signs,		7 05	
Blankets,		6 75	
Physician,		3 00	
Miscellaneous,		2 20	
			24,224 57
Middlesex Fells Reservation:—			
Labor and supplies, gypsy and brown-tail moth work,		$24,212 35	
Labor,	$11,549 25		
Teaming,	1,883 00		
Keep of horses,	1,077 86		
		14,510 11	
Travelling,		97 58	
Lighting,		538 46	
General supplies,		1,012 36	
Horses, carriages, etc.,		183 01	
Telephones,		116 82	
Repairs,		91 46	
Sanitary,		84 05	
Johnson pump,		62 46	
Express,		57 64	
Lighting office,		53 36	
Hydrant,		9 78	
Miscellaneous,		5 45	
			41,034 89
Revere Beach Reservation:—			
Labor,	$7,334 94		
Teaming,	15 75		
Keep of horses,	389 15		
		$7,739 84	
Lighting,		2,771 35	
Watering,		975 00	
Travelling,		70 61	
Amounts carried forward,		$11,556 80	$133,655 96 $185,415 00

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Amounts brought forward,		$11,556 80	$133,655 96	$185,415 00
General supplies,		598 30		
Horses, carriages, etc.,		372 59		
Telephones,		419 30		
Repairs,		36 65		
Photographs,		60 45		
Loam, etc.,		37 75		
Shelters,		30 70		
Water rates,		22 00		
Express,		13 40		
Heater,		12 40		
Auto truck license and number,		4 00		
Miscellaneous,		11 78		
			13,176 12	
Stony Brook Reservation: —				
Labor,	$3,027 95			
Teaming,	91 50			
Keep of horses,	234 74			
		$3,354 19		
General supplies,		129 04		
Horses, etc.,		54 60		
Telephones,		49 82		
Repairs,		29 60		
Lighting office,		2 25		
Sand,		90		
			3,620 40	
Beaver Brook Reservation: —				
Labor,	$1,418 98			
Teaming,	25 00			
Keep of horses,	81 47			
		$1,525 45		
Travelling		6 50		
General supplies,		64 24		
Horses, carriages, etc.,		55 11		
Telephones,		51 40		
Repairs,		57 25		
Labor and supplies, gypsy and brown-tail moth work,		187 35		
Plumbing, superintendent's house,		80 52		
Lockers for officers,		20 75		
Sewer assessment,		4 50		
Water rates,		16 00		
			2,069 07	
Charles River Reservation: — Riverside Section: —				
Labor,	$3,594 58			
Teaming,	99 50			
		$3,694 08		
Lighting,		8 50		
Travelling,		108 71		
General supplies,		849 26		
Horses, carriages, etc.,		85 75		
Telephones,		162 72		
Repairs,		13 50		
Labor and supplies, gypsy and brown-tail moth work,		96 85		
Lighting office,		153 94		
Water rates,		50 36		
Loam,		36 00		
Express,		20 60		
Life buoys,		20 59		
Amounts carried forward,		$5,303 86	$152,521 55	$185,415 00

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Amounts brought forward,	$5,303 86	$152,521 55	$185,415 00
Covering cushions,	15 00		
Flag,	10 50		
Chair,	7 00		
Physician's services,	6 00		
		5,342 36	
Charles River Reservation: —			
Speedway Section: —			
Labor, $9,179 95			
Teaming, 1,819 75			
Keep of horses, 1,388 88			
	$12,388 58		
Watering,	2,182 91		
Lighting,	2,089 46		
General supplies,	711 62		
Horses, carriages, etc.,	202 03		
Telephones,	141 34		
Repairs,	64 10		
Labor and supplies, gypsy and brown-tail moth work,	500 00		
Travelling,	13 46		
Loam,	133 00		
Water rates,	79 50		
Lighting office, etc.,	78 04		
Fence,	77 00		
Watchman's clock,	75 00		
Shrubs,	38 45		
Laundry,	33 85		
Awnings,	19 25		
Express,	3 60		
Miscellaneous,	10 04		
		18,841 23	
Neponset River Reservation: —			
Labor, $724 20			
Teaming, 105 00			
	$829 20		
Telephones,	34 70		
		863 90	
Mystic River Reservation: —			
Labor, $456 75			
Teaming, 36 00			
	$492 75		
Telephones,	39 65		
		532 40	
Lynn Shore Reservation: —			
Labor,	$602 21		
Lighting,	337 05		
General supplies,	84 88		
Travelling,	5 80		
Telephones,	3 00		
Advertising rules,	21 15		
		1,114 09	
Quincy Shore Reservation: —			
Labor,	$11 20		
		11 20	
Winthrop Shore Reservation: —			
Pay rolls, $894 75			
Teaming, 104 50			
	$999 25		
Watering,	736 31		
Lighting,	620 68		
General supplies,	395 69		
Amounts carried forward,	$2,751 93	$179,226 73	$185,415 00

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Amounts brought forward,	$2,751 93	$179,226 73	$185,415 00
Repairs to granolithic walk,	95 00		
Telephones,	68 05		
Horses, carriages, etc.,	40 00		
Water rates,	9 00		
Travelling,	1 60		
		2,965 58	
			182,192 31
Balance,			$3,222 69

Metropolitan Parks Boulevard Maintenance.

Appropriation for 1905, $88,824 00

Expenditures.

General expense: —			
Police: —			
Pay rolls,	$17,456 50		
Uniforms and equipment,	2,527 21		
	$19,983 71		
Salaries,	,279 81		
Rent,	2,595 03		
Telephones,	559 19		
Stationery,	1,155 09		
Extra clerical assistance,	278 60		
Travelling,	187 19		
Maps and books,	219 49		
Safe,	135 00		
Advertising rules,	130 49		
Postage, etc.,	217 37		
Towel supply,	44 95		
Rent of typewriter,	33 00		
Office supplies,	34 56		
Typewriter supplies,	30 60		
Typewriter repairs,	26 89		
Office repairs,	28 11		
Card cabinet and cards,	34 75		
Ice,	23 00		
Spring water,	4 75		
Binding records,	6 00		
Frames,	5 75		
Chair,	6 40		
Lettering books,	5 00		
Sharpening erasers, etc.,	1 37		
Cases,	2 30		
Letter boxes,	9 25		
Motor bicycle licenses,	4 00		
Lantern slides,	1 25		
		$34,043 00	
Blue Hills Parkway: —			
Labor,	$1,978 25		
Teaming,	261 50		
Keep of horses,	353 50		
	$2,593 25		
Watering,	1,990 44		
Lighting,	2,575 71		
Police signal system,	405 00		
General supplies,	361 43		
Horses, carriages, etc.,	44 75		
Telephones,	61 97		
Repairs,	4 34		
		8,036 89	
Amounts carried forward,		$42,079 89	$88,824 00

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Amounts brought forward,		$42,079 89	$88,824 00
Middlesex Fells Parkway: —			
Labor,	$5,059 51		
Teaming,	1,293 75		
Keep of horses,	18 50		
	$6,371 76		
Watering,	1,997 60		
Lighting,	6,232 90		
General supplies,	609 76		
Horses, carriages, etc.,	173 79		
Telephones,	89 60		
Repairs,	61 45		
Labor and supplies, gypsy and brown-tail moth work,	326 50		
Sand,	42 50		
Shrubs,	33 50		
Lighting office,	14 03		
Water rates,	4 50		
Express,	2 68		
		15,960 57	
Mystic Valley Parkway: —			
Labor,	$2,383 96		
Teaming,	421 50		
Keep of horses,	107 35		
	$2,912 81		
Watering,	1,024 96		
Lighting,	2,634 49		
General supplies,	302 99		
Horses, carriages, etc.,	55 05		
Telephones,	98 45		
Repairs,	18 38		
Labor and supplies, gypsy and brown-tail moth work,	1,649 58		
Shrubs,	6 80		
Express,	5 35		
Miscellaneous,	13 69		
		8,722 55	
Revere Beach Parkway: —			
Labor,	$4,338 13		
Teaming,	86 50		
Keep of horses,	119 13		
	$4,543 76		
Watering,	4,711 53		
Lighting,	4,925 82		
General supplies,	749 97		
Horses, carriages, etc.,	189 04		
Telephones,	2 72		
Broken stone,	165 58		
Furnishings,	23 60		
Photographs,	15 30		
Heater,	12 45		
		15,339 77	
Neponset River Parkway: —			
Labor,	$341 50		
Watering,	290 00		
Lighting,	270 94		
General supplies,	6 81		
		909 25	
Nahant Beach Parkway: —			
Labor,	$1,605 50		
Teaming,	65 00		
	$1,670 50		
Amounts carried forward,	$1,670 50	$83,012 03	$88,824 00

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Amounts brought forward,		$1,670 50	$83,012 03	$88,824 00
Watering,		200 88		
Lighting,		425 46		
General supplies,		212 27		
Telephones,		155 08		
Horses, carriages, etc.,		103 60		
Travelling,		31 85		
Stone dust,		75 00		
Express,		4 73		
			2,879 37	
Fresh Pond Parkway: —				
Labor,	$465 50			
Teaming,	9 00			
		$474 50		
Watering,		242 95		
Lighting,		448 50		
General supplies,		170 52		
Labor and supplies, gypsy and brown-tail moth work,		4 50		
Crushed stone,		16 41		
			1,357 38	
				87,248 78
Balance,				$1,575 22

NANTASKET BEACH MAINTENANCE.

Appropriation for 1905,			$17,900 00
Expenditures.			
Labor,	$3,007 77		
Teaming,	260 00		
Keep of horses,	91 83		
		$3,359 60	
Police: —			
Pay rolls,	$9,897 44		
Uniforms and equipment,	1,256 09		
		11,153 53	
General supplies,		189 73	
Watering,		712 90	
Lighting,		1,438 33	
Horses, carriages, etc.,		92 60	
Telephones,		113 20	
Repairs,		50 25	
Travelling,		39 05	
Water rates,		319 70	
Rent, superintendent's house,		266 64	
Loam, etc.,		56 75	
Shades for dormitory,		16 87	
Express,		36 25	
Miscellaneous,		5 00	
			17,850 40
Balance,			$49 60

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Wellington Bridge Maintenance.

Appropriation for 1905,		$2,661 00
Expenditures.		
Labor,	$1,569 50	
Teaming,	42 00	
	$1,611 50	
Watering,	120 61	
Lighting,	524 00	
General supplies,	92 95	
Telephones,	37 74	
Repairs,	82 22	
Shrubs,	172 97	
Water rates,	15 35	
		2,657 34
Balance,		$3 66

Metropolitan Parks Expense Fund.

Balance Jan. 1, 1905,			$54,403 56
Receipts, 1905,			87,461 75
			$141,865 31
Expenditures.			
General expense: —			
Preparing statement of fines,	$10 00		
		$10 00	
Blue Hills Reservation: —			
Repairs to and moving buildings,	$4,408 12		
		4,408 12	
Middlesex Fells Reservation: —			
Motor bicycles,	$476 60		
Animals,	199 66		
Repairs on stone crusher, etc.,	162 51		
Telephone,	41 46		
Supplies,	36 88		
Water rates,	22 00		
Electric light fixtures, headquarters,	15 34		
Repairs to buildings,	9 80		
Express,	9 30		
Miscellaneous,	46 58		
		1,020 13	
Revere Beach Reservation: —			
Bath-house: —			
Pay rolls,	$16,430 68		
Laundry machinery,	6,003 75		
Lighting,	1,888 42		
Bathing suits,	1,465 34		
Coal,	1,170 00		
Lumber,	426 58		
Engine room supplies,	425 67		
Towels,	337 50		
Supplies,	291 62		
Ice,	266 25		
Soap, etc.,	216 16		
Repairs,	205 98		
Tickets,	154 35		
Medicines and attendance,	143 01		
Hardware,	137 80		
Water rates,	99 10		
Key bands and rings,	93 47		
Amounts carried forward,	$29,755 68	$5,438 25	$141,865 31

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Amounts brought forward,	$29,755 68		$5,438 25	$141,865 31
Bath-house — *Con.*				
Disinfectant,	88 50			
Findings,	73 01			
Caps,	72 75			
Paint,	68 72			
Plumbing,	67 00			
Castors and rubbers,	64 72			
Brass bathing checks,	54 00			
Hose,	49 75			
Telephones,	47 54			
Furnishings,	36 50			
Stockings,	27 50			
Pointing,	25 85			
Stationery,	14 62			
Brass door kicks,	13 50			
Clock,	6 50			
Miscellaneous,	36 15			
		$30,502 29		
Horse,		275 00		
Motor for boat,		246 00		
Dory, oars, etc.,		92 00		
Lumber,		24 31		
Life buoys,		6 41		
			31,146 01	
Stony Brook Reservation: —				
Repairs to buildings,		$61 08		
Water rates,		42 00		
			103 08	
Beaver Brook Reservation: —				
Repairs, superintendent's house,		$136 32		
			136 32	
Hemlock Gorge Reservation: —				
Sewer connection,		$37 96		
Water rates,		15 37		
			53 33	
Charles River Reservation: —				
Riverside Section: —				
Fence, Quinnobequin Road,		$428 00		
Emergency boats,		371 90		
Bath-houses and sanitary,		363 89		
Labor,		301 13		
Rent, superintendent's house,		285 00		
Forest Grove, repairs and improvement,		152 05		
Shrubs,		121 49		
Planting,		93 75		
Seats,		81 93		
Typewriter,		80 00		
Stony Brook improvement,		66 70		
Water rates,		53 73		
Repairs,		37 51		
			2,437 08	
Speedway Section: —				
Horse,		$350 00		
Tool house,		325 00		
Street roller,		170 00		
Advertising sale of buildings,		6 00		
			851 00	
Mystic River Reservation: —				
Repairs to buildings,		$203 12		
Plumbing,		60 00		
Miscellaneous labor,		33 75		
Water rates,		31 00		
Advertising sale of buildings,		10 50		
			338 37	
Amounts carried forward,			$40,509 44	$141,865 31

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Amounts brought forward,		$40,503 44	$141,865 31
Lynn Shore Reservation: —			
Police signal boxes,	$300 00		
Cleaning beach,	54 00		
Scraping fence,	41 00		
Advertising sale of buildings,	8 25		
Miscellaneous,	3 00		
		406 25	
Winthrop Shore Reservation: —			
Pipe,	$7 54		
Lead,	7 00		
		14 54	
Blue Hills Parkway: —			
Cement lined pipe,	$279 29		
		279 29	
Middlesex Fells Parkway: —			
Loam,	$225 00		
Repairs to office,	46 37		
Commission, sale of Chadwick house,	25 00		
		296 37	
Mystic Valley Parkway: —			
Wagon,	$120 00		
Geese,	10 00		
Water rates,	8 50		
		138 50	
Revere Beach Parkway: —			
Watering cart,	$352 45		
Planting,	307 50		
Fence,	153 63		
Repairs, buildings,	133 38		
Lawn mower,	90 00		
Water rates,	18 00		
		1,054 96	
Neponset River Parkway: —			
Grading of playground,	$314 00		
Water rates,	12 00		
		326 00	
Nahant Beach Parkway: —			
Bath-house: —			
Pay rolls,	$3,141 15		
Bathing suits,	2,477 00		
Paint,	294 01		
Lighting,	162 64		
Gasolene,	55 24		
Telephones,	50 38		
Medicines and attendance,	35 00		
Coal,	35 00		
Galvanized wire,	31 25		
Lumber,	27 20		
Hardware,	16 21		
Supplies,	14 69		
Ice,	12 37		
Mirrors,	5 40		
Express,	4 40		
Stationery,	3 25		
	$6,365 19		
Bulkhead,	444 43		
Police signal system,	335 00		
Shelters,	144 80		
Railroad ties,	104 79		
Plan for bath-houses, Short Beach,	75 00		
Labor,	16 00		
		7,485 21	
Amounts carried forward,		$50,504 56	$141,865 31

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Amounts brought forward,			$50,504 56	$141,865 31
Wellington Bridge:—				
Repairs to bridge house,		$28 46		
			28 46	
Nantasket Beach Reservation:—				
Bath-house:—				
Pay rolls,	$4,589 44			
Coal,	1,221 00			
Water rates,	387 21			
Paint,	309 48			
Engine room supplies,	74 84			
Lighting,	67 74			
Towels,	60 75			
Ice,	52 30			
Soap,	51 68			
Tickets,	47 40			
Stockings,	41 25			
Bathing suits,	25 51			
Rubbish barrels,	22 20			
Medicines and attendance,	21 72			
Caps,	21 00			
Telephones,	20 25			
Hose,	18 10			
Findings,	17 00			
Laundry,	12 48			
Supplies,	10 57			
Hardware,	6 30			
Stationery,	5 30			
Hair brushes,	4 50			
Repairs,	3 50			
Miscellaneous,	20 18			
		$7,111 70		
Repairs and alterations to buildings,		6,767 19		
Sanitary,		4,757 26		
Loam and grading,		4,878 20		
Bulkhead,		1,493 67		
Dormitory supplies,		366 16		
Labor,		297 50		
Engineering:—				
Pay rolls,	$165 67			
Expenses,	80			
		166 47		
Landscape Architects:—				
Services,	$137 34			
Expenses,	5 88			
		143 22		
Horse,		137 50		
Fire extinguishers,		134 50		
Repairs, Nantasket Avenue,		117 00		
Fire escapes,		98 05		
Plumbing,		90 19		
Cesspool,		73 84		
Pipe privilege,		5 00		
Miscellaneous,		7 39		
			26,644 84	77,177 86
Balance in hands of State Treasurer,				$64,687 45

Metropolitan Parks Trust Fund.

Balance Jan. 1, 1906,	$89 74

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APPENDIX.

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PROCEEDINGS OF APPORTIONMENT COMMISSION.

General Apportionment, under Chapter 419 of the Acts of the Legislature for the Year 1899.

COMMONWEALTH OF MASSACHUSETTS.

Suffolk County. Supreme Judicial Court. In Equity.

In the matter of the petition of William B. de las Casas *et al.*, Metropolitan Park Commissioners, for appointment of commissioners to determine payments by cities and towns under Acts of 1899, chapter 419.

Petition.

Respectfully represent William B. de las Casas, Edwin B. Haskell, Edwin U. Curtis, David N. Skillings and Ellerton P. Whitney, your petitioners: —

That they constitute the Board of Metropolitan Park Commissioners, duly established under and by virtue of an act of the Legislature of Massachusetts, entitled "An Act to establish a Metropolitan Park Commission," being chapter 407 of the acts passed in the year A.D. 1893, and acting under said act and acts in amendment thereof and in addition thereto.

That in and by section 1 of chapter 419 of the Acts of the Legislature of the year 1899 (a copy of which, together with a copy of section 2 of said last-mentioned act, is hereto annexed, marked "Exhibit A") it is provided that, in order to determine the proportionate sums annually to be paid into the treasury of the Commonwealth by the various cities and towns within the Metropolitan Parks District, beginning with the first day of January in the year 1905, and continuing until the first day of January in the year in which a new award is made, as therein provided, to meet the interest and sinking fund requirements therein provided for, and to provide the amount required to meet the expenses of said Board, and of the care, maintenance and operation of the parks, reservations, boulevards and other works acquired, cared for and controlled by said Board, as therein provided, there shall be three

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commissioners appointed for that purpose by this honorable court, on petition of this Board.

That for the purpose of carrying out the provisions of said acts it is necessary and expedient that said commissioners be appointed by the court as aforesaid.

They therefore pray that after such notice as this honorable court shall order, if any, there may be three commissioners appointed in the manner and for the purposes, and with all the rights, powers, privileges, duties and obligations in said act of 1899 mentioned or referred to.

And for greater certainty in all matters and things connected with this petition and the subject-matter thereof, your petitioners crave leave to refer to the Acts of 1893, chapter 407, and all acts in amendment thereof and in addition thereto.

WILLIAM B. DE LAS CASAS,
EDWIN B. HASKELL,
EDWIN U. CURTIS,
DAVID N. SKILLINGS,
ELLERTON P. WHITNEY,
Board of Metropolitan Park Commissioners

ARTHUR W. DEGOOSH,
Assistant Attorney-General, of Counsel.

EXHIBIT A.

[ST. 1899, CHAPTER 419.]

SECTION 1. In the year nineteen hundred and in every fifth year thereafter the supreme judicial court in equity, on application of the metropolitan park commission or of the attorney-general, or of any city or town of the metropolitan parks district by its attorney, and after such notice as the said court may order to each city and town of that district, shall appoint three commissioners, neither of whom shall be a resident of any city or town in said district, who shall, after such notice and hearing as they deem sufficient and in such manner as they deem just and equitable, determine and make award of the proportions in which each of the cities and towns of said district shall annually pay money into the treasury of the Commonwealth, beginning with the first day of January of the year in which such commissioners are required to be appointed, until the first day of January of the year in which a new award is made hereunder, to provide the amount for that year as estimated by the treasurer of the Commonwealth to meet the interest and sinking fund requirements of the appropriations and loans authorized by chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three, chapter two hundred and eighty-eight of the acts of the year eighteen hundred and ninety-four, chapter three hundred and five of the acts of

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the year eighteen hundred and ninety-five, and all acts in addition thereto and in amendment thereof, and the amount required to meet the expenses for that year of said board of metropolitan park commissioners, and of the care, maintenance and operation for that year of the parks, reservations, boulevards and other works, acquired, cared for or controlled by said board under said acts, as annually authorized by the general court, and the deficiency, if any, in the estimates and payments for the preceding year as found by said treasurer, and shall return their award thus determined into said court: *provided, however*, that the commissioners shall fix and return the proportion to be paid by the city of Boston for each year of the first of said terms at fifty per cent. Every such award when accepted by said court shall be a final and conclusive adjudication for the term for which it is made, of all matters referred to the commissioners, and shall be binding upon all parties.

SECTION 2. The treasurer shall in the year nineteen hundred and in each year thereafter estimate the several amounts required for that year from each city and town of said district, in accordance with said award, to provide the entire amount needed to meet the interest and sinking fund requirements of the appropriations and loans authorized by said chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three, and acts in addition thereto and in amendment thereof, and to meet the expenses for that year of said metropolitan park commission incurred under said acts, and of the care, maintenance and operation of the parks, reservations and works acquired, cared for and controlled by said board under said acts, and the deficiency in the estimates and payments for these purposes for the previous year; and the treasurer shall also in the same manner estimate the several amounts required for that year from each city and town of said district, to provide one-half of the entire amount needed to meet the interest and sinking fund requirements of the appropriations and loans authorized by chapter two hundred and eighty-eight of the acts of the year eighteen hundred and ninety-four, and acts in addition thereto and in amendment thereof, and one-half of the expenses for that year of said metropolitan park commission under said acts, and of the care, maintenance and operation of the roads, boulevards and other works acquired, cared for and controlled by said board under said acts, and one-half of the deficiency in the estimates and payments under said acts for these purposes for the preceding year, and shall include the several amounts thus estimated to be needed each year from each city and town of said district in the sum to be paid by each as its state tax for that year, and shall charge the remaining one-half of the entire amount required for that year for interest, sinking fund requirements, and for expenses and deficiency, as aforesaid, under said chapter two hundred and eighty-eight of the acts of the year eighteen hundred and ninety-four to the Commonwealth, and shall include the same in the annual state tax for that year; and the amounts thus required in each year of the several cities and towns of said district and of the Commonwealth shall be paid by each into the treasury of the Commonwealth at the time required for the payment and as a part of the state tax of each for that year.

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COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.

In the matter of the petition of William B. de las Casas *et al.*, Metropolitan Park Commissioners, for the appointment of commissioners to determine payments by cities and towns under Acts of 1899, chapter 419.

DECREE.

And now, upon the above-entitled petition, it appearing to the court that due notice thereof was given to all cities and towns, respondents, according to the order of the court, and after due hearing thereof, no person objecting, it is ordered that Arthur P. Rugg of Worcester, James F. Jackson of Fall River and John J. Flaherty of Gloucester be and they are hereby appointed commissioners under section 1 of chapter 419 of the Acts of the year 1899, to determine and make award of the proportions in which each of the cities and towns of said district shall annually pay money into the treasury of the Commonwealth, beginning with the first day of January in the year 1905, until the first day of January of the year in which a new award is made as provided for by said act, to provide the amount for each of said years as estimated by the Treasurer of the Commonwealth to meet the interest and sinking fund requirements therein provided for, and to provide the amount required to meet the expenses of said Board of Metropolitan Park Commissioners, and of the care, maintenance and operation of the parks, reservations, boulevards and other works acquired, cared for and controlled by said Board as therein provided, and the deficiency, if any, in the estimates and payments for the preceding year as found by said Treasurer; and to do and perform all the other duties prescribed for them by said act and all other acts of the Legislature imposing powers and duties upon said commissioners, and to exercise all the powers thereby and by law reposed upon the said commissioners by any and all acts of the Legislature.

By the court,

WALTER F. FREDERICK,
Assistant Clerk.

FEB. 21, 1905.

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COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.
No. 9159.

William B. de las Casas *et al.*, petitioners, under Acts of 1899, chapter 419.

REPORT OF THE DETERMINATION AND AWARD OF COMMISSIONERS FOR APPORTIONMENT.

The undersigned, Arthur P. Rugg, James F. Jackson and John J. Flaherty, duly appointed commissioners in the above cause, to determine and make award of the proportions in which each of the cities and towns in the Metropolitan Parks District shall annually pay money into the treasury of the Commonwealth, as more fully appears in the decree, have attended to their duties, and make the following report of their determination and award.

The commissioners met on March 3, 1905, appointed a time and place for hearing all parties interested in the matters submitted to their determination, and gave due notice thereof. The notice, with return of service, is filed herewith. Hearings were held at Boston on the sixteenth day of March, and by adjournment upon the twenty-third, twenty-fourth, twenty-fifth and twenty-sixth days of May, and upon the fourteenth, fifteenth, sixteenth and nineteenth days of June, 1905. The Attorney-General, for the Commonwealth and the petitioners, and all the cities and towns in the Metropolitan Parks District, with the exception of Chelsea and Dover, by their representatives, appeared at the hearings, and presented such evidence, briefs and arguments as they desired, and they and all other persons interested have been fully heard. The commissioners have visited such of the parks, reservations and boulevards under the control of the Metropolitan Park Commission, and such of the local parks of the several municipalities, as they believed necessary, in order to properly perform their duties, or as they have been especially requested to visit. The views were taken on the tenth, eleventh and twentieth days of May, and the twenty-third, twenty-fourth and twenty-eighth days of June. Further meetings were held on the thirty-first day of May, the nineteenth and twenty-ninth days of June, the seventeenth day of July and the second and thirtieth days of August.

Parks.

By decrees of this court in 1894, George F. Richardson, Charles W. Clifford and Hiram P. Harriman were appointed commissioners for apportionment, under the Metropolitan Parks Acts.

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These commissioners made an elaborate report of award, concluding with a schedule of proportions of contribution to be made by each municipality, which was the result of combining percentages based upon population and valuation, with computations of special benefits determined by them to have been received by the several municipalities. This award was confirmed by the court, but never became operative, by reason of section 4, chapter 550, Acts of 1896. In 1900 Charles Francis Adams, Thomas M. Stetson and John C. Hammond were appointed commissioners for apportionment, under chapter 419, Acts of 1899, and made their award, which was approved by the court. The report of these commissioners states that they rejected population and special park betterments, and adopted valuation as the basis of their determination, made allowance for local contributions to parks, and modified the result by taking into consideration the wealth of the different municipalities, dividing them into three classes: I., those whose valuation was less than $1,000 per capita; II., those in which it was between $1,000 and $2,000; and III., those in excess of $2,000; and deducted 25 per cent. of the amount which would otherwise have fallen upon the municipalities in Class I., and added it to those in Class III. This apportionment has been in force. The theories upon which these awards were made were supported in reports by vigorous discussions from the eminent lawyers on each commission.

It is apparent from this review that no special rule has so commended itself to previous commissioners as to have become a precedent of binding or even strongly persuasive authority. Moreover, for the first time the mandate of the statute absolutely fixing the contribution of Boston at 50 per cent. is no longer operative. It becomes the duty of the present commissioners to determine the proportions of contribution from all the municipalities, Boston as well as the other cities and towns interested in the apportionment, "in such manner as they deem just and equitable," without legislative limitation upon the exercise of their sound judgment. This fact presents the problem in a new light.

The question lying at the threshold of the inquiry is, whether any arbitrary percentage of contribution ought to be fixed for Boston. Boston has made a large expenditure for parks on its own account, and has established and maintains a noble park system, which is necessarily wholly within its own limits. This fact is urged as the decisive reason for some special concession. But other municipalities in the district have established park systems, which in area and cost and comparison to density of population are proportionately at least as much entitled to a special conces-

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sion as is Boston. Boston's *per capita* valuation is the largest of all the cities in the district, and larger than that of most of the towns. In proportion of net debt to valuation it stands sixth among the cities in the district, while its tax rate has for several consecutive years been lower than that of any other city in the district. It would fall in the third or wealthy class of municipalities established by the last commissioners for apportionment. In density of population, which is one of the tests by which to gauge the need for parks, it is third in the district; or, if its large suburban districts of Brighton, Dorchester and West Roxbury are omitted, it has far the greatest density of population to be found in the district. While it is true that its local parks are open to the general public and are of appreciable special advantage to Brookline, their existence does not reduce to the level of many of the towns of the district its proportionate need for the broader areas of the Metropolitan Parks System. The gross expense incurred in this regard is probably materially reduced by the assessments collected of neighboring real estate, and there must be a considerable additional revenue from increased valuations. Moreover, the purpose of the establishment of a Metropolitan Parks System appears to have been not to furnish local breathing or recreation places in particular cities or towns, but to take into State preservation such commanding features of great natural beauty as, by reason of location and extent, lay beyond the confines of ordinary municipal acquirement. The policy of the Metropolitan Park Commission, in its takings, has been in pursuance of this purpose. The various municipalities are left free to establish such local park systems as their wealth, tastes and endowments of nature make wise; while the takings of the Metropolitan Park Commission have been of tracts of land forming particular park units, but lying in most instances within the territory of two or more municipalities. No theory for a special concession to Boston has been suggested, and the commissioners have been unable to formulate any which does not appear to be unjust and oppressive to other municipalities. Indeed, the brief for the city of Boston concedes the impracticability of establishing a just general principle for a concession, by asserting that its share of the contributions "must be fixed by some arbitrary percentage, and the rest of the sum to be raised divided among the other cities and towns by some rule;" or, again, that its percentage must be "a purely arbitrary one." The special limitation of Boston's contribution to 50 per cent., which has bound previous commissioners, was undoubtedly wholly arbitrary. It has been asserted, without contradiction, that this special limitation was placed in the statute

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as the result of an understanding reached at the suggestion of the then mayor of Boston, that, if this limitation were inserted, no opposition would be made by the representatives of Boston to the enactment of the Metropolitan Parks Act. An arbitrary fixing for Boston of a smaller percentage, as an exception to a general rule, equitable for all other municipalities, fails to find a sufficient basis in the evidence presented. Taking into account all the circumstances which affect the situation, and giving due weight to all the considerations urged, the commissioners are unable to find ground, in justice or equity, for establishing a special concession to Boston; but they believe that whatever general rule may be found fairly applicable to the district as a whole should include Boston in its scope.

There has been no consensus of opinion as to the proper basis for apportionment, but various theories have been elaborated by the able counsel who have represented the several municipalities. The general proposition is that the commissioners may adopt any rule of apportionment, whether simple or complicated, which in the exercise of a reasonable discretion seems to best accomplish what is just and equitable.

It has been urged that the apportionment should be according to the special benefits received by the several cities and towns from the acquisition and maintenance of the various park reservations. No evidence was offered upon which to found an opinion as to the amount or the existence of such special benefits. No statistics were presented showing where the people who use the parks live or come from. It did not appear that in any locality there had been any appreciable increase in real estate values due to this cause. The view afforded the commissioners no proof of such benefits. Some municipalities, in which were large areas of park reservations, claimed that the exemption of this property from taxation had wrought them harm; others, that the existence of the reservation brought large crowds of noisy and undesirable persons from the congested centres of population, especially on holidays and summer evenings, within their otherwise quiet and orderly territory, causing annoyance to their residents and expense for police protection. No city or town admitted any special benefit from the presence of a reservation within its borders. The commissioners have endeavored to ascertain whether, and to what extent, such special benefits exist; but are convinced that data sufficient to warrant a satisfactory conclusion upon this point are wanting, and in the nature of things must continue to be beyond reach for the present. Therefore, the special benefit theory of apportionment has been rejected.

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Some municipalities urged that population should be adopted as the basis of apportionment. The commissioners have had tables prepared to show the result of such an apportionment, and have given them careful consideration. This theory is not generally recognized as the rule for the distribution of public burdens. It has few attractive features when considered abstractly, and when applied concretely to municipalities composing the Parks District, it does not work out satisfactory results. Its effect is to place a disproportionate burden upon the poor but populous communities, and to relieve from its just share the wealthy ones. As it does not appear to the commissioners just and equitable, they have declined to adopt it.

Density of population was also urged as the theory best adapted to the existing conditions. Tables have been prepared showing the result of an apportionment upon this basis. The argument in its support is ingenious and plausible, as the necessity for park reservations must exist largely in proportion to the number of people dwelling in any restricted area. It is open to many of the objections which apply to the population theory, and when used as the sole rule for apportionment, it does not, in the opinion of the commissioners, work out equitable results.

It has been strongly argued that the rule of apportionment and classification of cities and towns according to wealth, adopted by the commissioners of 1900, should be followed. No one can read the final full report of the doings of these commissioners without recognizing the important part which the limitation to 50 per cent. upon Boston's contribution sustained in supporting the theory of apportionment then adopted, and in furnishing the groundwork for justifying the division of these municipalities into the three classes according to the *per capita* valuation. Essentially, it was in the distribution among the other cities and towns of the 12 or 13 per cent. which under the general valuation rule adopted by the commission would have been assessed upon Boston but for the statutory limitation, that the additional burdens were placed upon certain wealthier municipalities. The fact that this amount was necessarily to be taken from Boston, and that Boston could not be affected by the classification according to *per capita* valuation, made it possible to avoid some unsatisfactory results which might have been otherwise reached in following out this theory of apportionment. *Per capita* valuation, although an important, is not an exact, test of municipal wealth; the ratio of indebtedness to valuation, and tax rates, are significant considerations in determining the question. A low tax rate, small ratio of indebtedness to valuation, and large *per capita* valuation, or any of them, may be indicative

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in part of wise municipal administration through a series of years. Laws ought not to be so executed, nor the discretion of tribunals so exercised, as to discourage sagacity and thrift in the management of civic affairs. Moreover, any classification of municipalities according to wealth must always be arbitrary, and not based upon a general rule of continuing or wide application. The same is true of the amount of deduction to be made from the poorer towns and addition to wealthier ones. While the action of the commissioners of 1900 may have abundant justification in the statutory limitation arbitrarily imposed upon Boston, making it desirable that the inequalities of burdens thus thrown upon the poorer communities be lightened, the present commissioners conceive that, under the free conditions now surrounding the problem, it is not equitable to adopt classifications dependent upon their individual notions, and not founded upon a generally recognized principle. Any arbitrary discriminations between the contributions of different municipalities is quite as strongly warranted in behalf of some of the fringe towns of the district, included in it solely for geographical considerations, as for any other reason.

The commissioners have had prepared tables of percentages based upon valuation, one of real, one of personal, and a third of both real and personal, property, upon population and upon density of population, and have studied the results so obtained, both independently and in various combinations. They have investigated the history of the Metropolitan Parks System, and have considered the park reservations from a geographical standpoint, from that of local contribution to and appropriations for parks, and from that of ability to meet the expenditure. They have formulated, discussed and considered other rules than those herein enumerated. "The basis and method of apportionment should be simple, definite, easily understood and of familiar application." (170 Mass. 117.) Novel conceptions as to the distribution of this taxation should not be formulated and approved, in preference to general rules which have stood the test of experience, merely because a wide discretion is conferred upon the commissioners. Unless justice will be wrought, it is wise to keep within the ancient landmarks of taxation. The distribution of public burdens according to property valuation, including both real and personal, is the policy of this Commonwealth, approved by long usage. As applied to all the municipalities affected by this apportionment, and tested by all the schedules mentioned and all the arguments presented, the commissioners believe that this principle of apportionment on the whole is the nearest approach to justice and equity. It is, therefore, adopted. It is singularly appropriate to the present apportionment, for the

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reason that the Metropolitan Parks District is a new political entity, established for a specific, definite purpose, the territorial limits of which were based upon geographical and social considerations. The district was created to preserve for all time for the use of a crowded population the open areas in which the beauties of nature can best be enjoyed. In the last analysis, this is the most permanent and enduring form of public improvement. These reservations will never be outgrown, worn out or discarded by the progress of civilization. They will continue to be an increasingly valuable asset of the district as a whole, as long as it continues to be a centre of commercial, financial, manufacturing and educational activity, and add to the opportunities for pleasurable and wholesome living upon every dwelling site within its borders. Thus the advantages of the reservations are not so essentially present and local as lasting and general. Present and local considerations, which may turn out to be temporary and fleeting, are therefore deserving less weight in the apportionment of this than of most public charges.

It has been urged that deductions from whatever general basis might be adopted should be made in favor of certain municipalities, for various reasons. Several cities and towns have established local park systems, and some have expended large sums for this purpose; and it has been argued that special allowance should be made, on this account, in the percentages of contributions to be framed. The view taken of these local parks, as well as the other evidence and the arguments, has failed to convince the commissioners that such deductions ought to be made in any case. Generally, these park expenditures have been made to meet local necessities, are of great local benefit, and have not in a calculable degree lessened the expense of or necessity for the Metropolitan Parks System. All parks, whether established by the municipality or the district, are open to the whole public; and, as one community becomes a centre of trade or other attraction, its parks will be more generally used. Nevertheless, the paramount reason for expenditures for parks by individual municipalities has been the desire for local improvement, and the extent of such expenditures has been largely in proportion to the wealth or density of population of the respective cities and towns. An expenditure of this sort is good municipal investment, as the local parks are ordinarily so located as to increase real estate values in the immediate neighborhood. At first view, the Lynn woods seems to be an exception. But, while this reservation is metropolitan in size, character, beauty and location, it also serves an important use in conserving the purity of the sources of Lynn's water supply. Moreover, Lynn, with its large and rapidly increasing population, is a close approach

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to being in the enjoyment of special benefits from the Metropolitan Parks System, by reason of its proximity to the Revere Beach Reservation. Furthermore, the adoption of valuation as the basis of apportionment gives to each municipality the benefit or credit for its investment in parks to the extent that such property is exempt from taxation and valuation. This is all the concession which the commissioners think can, in view of all the circumstances, equitably be made.

Some towns, in which are large areas of Metropolitan Park Reservations, have urged that the removal of this land from local taxation was a consideration entitling it to a special deduction. This argument is wholly out of harmony with the theory of exemption from taxation of property devoted to public uses, which is a cardinal principle of the general tax scheme that has long prevailed in this Commonwealth. No evidence or argument for a special deduction has commended itself to the commissioners as on the whole likely to result in ultimate justice.

It has been strenuously urged that population should be adopted as the rule of apportionment of expense of park maintenance, on the ground that maintenance is based on use, and use on population, and that those who use should pay for this luxury of parks. From the view-point of civic foresight and administrative wisdom, parks are quite as necessary as the more obviously imperative demands for municipal expenditure. Use of parks is probably not directly proportionate to population. The opportunity of a given population for leisure is quite as important upon this issue as the number of people within a specific area. A substantial part of the maintenance expenditure is for purposes not directly dependent upon use of the parks, but for their permanent development and preservation. Therefore, the argument does not seem to the commissioners of sufficient weight to cause the abandonment of the valuation basis, which has all the grounds of support, when viewed with reference to this item of expense, that it possesses as the general rule.

It appears, from information furnished by the State Treasurer, that the Metropolitan Parks Loan, issued in pursuance of the several Park Statutes, exclusive of the Boulevards and Nantasket Beach and the Charles River Basin loans and of incidental receipts, amounted, on Jan. 1, 1905, to $7,620,000. This amount is likely to be increased $300,000 annually until 1907, with an additional increase of $70,000 in 1905 for the Nahant Bath-house. The estimated requirements for 1905 for sinking funds were $102,026.99, for interest $243,744.99, and for maintenance $186,370.49, making a total of $532,142.37.

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Having fully considered the evidence and arguments and all circumstances and conditions, the commissioners deem it just and equitable, and therefore determine and make award of the proportions in which each of the cities and towns in the Metropolitan Parks District shall annually pay money into the treasury of the Commonwealth during the term of this award, to provide the amount for each year, as estimated by the Treasurer of the Commonwealth, to meet the interest and sinking fund requirements of the appropriations and loans authorized by chapter 407, Acts of the year 1893, chapter 305, Acts of the year 1895, and all acts in addition thereto and in amendment thereof, except chapter 288, Acts of the year 1894, chapter 464, Acts of the year 1899, chapter 465, Acts of the year 1903, and all acts in amendment of and in addition to said three last-named acts, and the amount required for each year to meet the expenses of said Board of Metropolitan Park Commissioners, and of the care, maintenance and operation of the parks, reservations and other works acquired, cared for or controlled by said Board under said acts, except as aforesaid, and the deficiency, if any, in the estimates of payments for the preceding year as found by said Treasurer, and all other contributions required by law for Metropolitan Parks, except as herein otherwise provided, as shown by the percentages set against the names of said cities and towns respectively in the following Table A: —

TABLE A.

Boston,	.62237	Hingham,	.00244
Cambridge,	.05405	Hull,	.00214
Chelsea,	.01203	Hyde Park,	.00605
Everett,	.01037	Milton,	.01240
Lynn,	.02733	Nahant,	.00368
Malden,	.01613	Needham,	.00209
Medford,	.01081	Revere,	.00583
Melrose,	.00772	Saugus,	.00208
Newton,	.03479	Stoneham,	.00252
Quincy,	.01165	Swampscott,	.00531
Somerville,	.02866	Wakefield,	.00410
Waltham,	.01136	Watertown,	.00630
Woburn,	.00556	Wellesley,	.00585
Arlington,	.00503	Weston,	.00341
Belmont,	.00306	Westwood,	.00109
Braintree,	.00258	Weymouth,	.00347
Brookline,	.04988	Winchester,	.00532
Canton,	.00206	Winthrop,	.00426
Dedham,	.00566		
Dover,	.00056		1.00000

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Boulevards.

The advantages from the construction and maintenance of boulevards stand upon a somewhat different basis from parks. Highways have for many decades been regarded in this Commonwealth as proper foundation for the assessment of betterments. The benefits springing from them are tangible and appreciable. One-half the interest and sinking fund requirements and one-half of the expense of care and maintenance and one-half the office and running expenses of the Metropolitan Park Commissioners occasioned by roadways and boulevards are by the statute to be paid by the Commonwealth, and the other half by the cities and towns in the Metropolitan Parks District. The commissioners believe it fair, on an examination both of the effect of the distribution of the burden and of the history of the apportionment of the last commissioners, to apportion upon the municipalities in which the boulevards are constructed 25 per cent. of the half to be apportioned to the district (being 12½ per cent. of the total expense), and the remaining 75 per cent. (being 37½ per cent. of the entire amount) upon the district in proportion to valuation.

It appears, from a statement of the State Treasurer, that the Metropolitan Parks Loan, Series Two, being the Boulevard Loans, issued under the authority of the several Boulevard Statutes, amounted, on Jan. 1, 1905, to $4,485,000, and that this amount is likely to be increased $300,000 each year until and including 1907. The one-half of the Metropolitan Parks Loans, Series Two, to be paid for by the district, was on the same date $2,242,500. The sinking fund requirement to be collected of the district for 1905 is estimated at $28,605.48, the interest account at $67,098.13 and the maintenance at $44,802.96, making a total of $140,506.57.

Having fully considered the evidence and arguments and all the circumstances and conditions attending the subject-matter, the commissioners deem it just and equitable, and therefore make award of the proportions in which each of the cities and towns in the Metropolitan Parks District shall annually pay money into the treasury of the Commonwealth during the term of this award, to provide the amount each year required by law to be assessed upon the district for said Boulevards and their maintenance under chapter 288, Acts of the year 1894, and all acts in amendment thereof and in addition thereto, as shown by the percentages set against the names of said cities and towns respectively in the following Table B: —

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TABLE B.

Boston,	.46716	Hingham,	.00184
Cambridge,	.04558	Hull,	.00160
Chelsea,	.02482	Hyde Park,	.00618
Everett,	.03986	Milton,	.04158
Lynn,	.02166	Nahant,	.00822
Malden,	.02936	Needham,	.00156
Medford,	.05678	Revere,	.05432
Melrose,	.00578	Saugus,	.00156
Newton,	.02610	Stoneham,	.00188
Quincy,	.02064	Swampscott,	.00398
Somerville,	.02994	Wakefield,	.00308
Waltham,	.00852	Watertown,	.00472
Woburn,	.00416	Wellesley,	.00438
Arlington,	.00378	Weston,	.00256
Belmont,	.00230	Westwood,	.00082
Braintree,	.00194	Weymouth,	.00260
Brookline,	.03740	Winchester,	.02394
Canton,	.00154	Winthrop,	.00320
Dedham,	.00424		
Dover,	.00042		1.00000

The percentages in Table B apply only to the half of the Boulevard charges and expenses, which by law is to be paid by the district.

Under chapter 178 of the Acts of 1904, Boston paid $360.05 per thousand of the State tax.

Nantasket Beach.

For the reasons hereinbefore stated, the commissioners believe that apportionment of the contributions to sinking fund, interest and maintenance for the Nantasket Beach Reservation should be made between the cities and towns in the Metropolitan Parks District and Cohasset in proportion to valuation.

It appears, from a statement of the State Treasurer, that the Nantasket Beach Loans amounted, on Jan. 1, 1905, to $700,000. The sinking fund requirement for the year 1905 was estimated at $8,332.29, the interest account at $21,498.21 and maintenance at $18,079.92, making a total of $47,910.42. The commissioners, having fully considered the evidence and arguments and the attendant circumstances and conditions, deem it just and equitable, and therefore make award of the proportions in which each of the cities and towns in the Metropolitan Parks District, deeming and treating Cohasset as a part of the Metropolitan Parks District for this purpose, shall annually pay money into the treasury of the

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Commonwealth during the term of this award, to provide the amount required each year under chapter 464, Acts of the year 1899, and all acts in amendment thereof and in addition thereto, as shown by the percentages set against the cities and towns in said district, in the following Table C: —

TABLE C.

Boston,	.62009	Hingham,	.00243
Cambridge,	.05386	Hull,	.00213
Chelsea,	.01198	Hyde Park,	.00603
Everett,	.01033	Milton,	.01236
Lynn,	.02723	Nahant,	.00366
Malden,	.01607	Needham,	.00208
Medford,	.01077	Revere,	.00580
Melrose,	.00769	Saugus,	.00207
Newton,	.03467	Stoneham,	.00251
Quincy,	.01161	Swampscott,	.00529
Somerville,	.02855	Wakefield,	.00409
Waltham,	.01132	Watertown,	.00628
Woburn,	.00554	Wellesley,	.00583
Arlington,	.00501	Weston,	.00340
Belmont,	.00305	Westwood,	.00109
Braintree,	.00257	Weymouth,	.00346
Brookline,	.04970	Winchester,	.00530
Canton,	.00206	Winthrop,	.00424
Cohasset,	.00366		
Dedham,	.00563		1.00000
Dover,	.00056		

The Charles River Dam. (*Chapter 465, Acts of 1903.*)

This chapter is entitled "An Act to authorize the construction of a dam across the Charles River between the cities of Boston and Cambridge." Section 9 provides that: —

The commissioners next appointed under the provisions of chapter four hundred and nineteen of the acts of the year eighteen hundred and ninety-nine, and amendments thereof, in apportioning the expenses of maintaining the metropolitan parks system shall include as part thereof the expense of maintenance incurred under the preceding sections of this act; shall also determine, as they shall deem just and equitable, what portion of the total amount expended for construction under sections three, four, five and six of this act shall be apportioned to the cities of Boston and Cambridge as the cost of removal of Craigie bridge and the construction of a suitable bridge in place thereof, and the remainder shall be considered and treated as part of the cost of construction of the metropolitan park system. The treasurer and receiver general shall determine the payments to be made each year by said cities, one-half by

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each, to meet the interest and sinking fund requirements for the amounts apportioned to them as the cost of such bridge, and the same shall be paid by each city into the treasury of the Commonwealth as part of its state tax.

After arguments by counsel, the commissioners for apportionment interpreted this section to apply to them and to impose duties upon them. They therefore held hearings respecting the subject-matter of said chapter 465, of which due notice was given, and at which the Charles River Basin Commission, through its secretary and chief engineer, and all other parties interested, so far as they desired, were heard.

The undisputed evidence at these hearings showed that there had been no expense of maintenance incurred under sections 1 to 8, both inclusive; that the Charles River Basin Commission had let a contract for the construction of a portion of the dam between the cities of Boston and Cambridge, but that very substantial parts of the structure were omitted from this contract, such as the draw, the paving of the roadway and some other items, the cost of which would undoubtedly aggregate many thousands of dollars, and that no estimate of what expenses would be incurred in completing the structure for public use had been or could at the present time reasonably be made; that the prices for several distinct subject-matters in the contract for the dam were by quantities, which might vary materially from estimates, as the character of the river bottom and the soil in the vicinity disclosed itself in construction, and that this could be determined with certainty only as the work progressed; that the dredging and other work authorized by the last paragraph of section 4 was not only not done and not contracted for, but the Basin Commission was not then possessed of sufficient knowledge to enable it to determine the amount and character of dredging which ought to be done, or the extent of the other work required; that the construction of the marginal conduit authorized by section 5 upon the north side of the basin has not been begun nor contracted for, nor the expense of it estimated, and the construction of the marginal conduit upon the south side of the basin had been contracted for only for a distance of about 2,400 feet, and that the Basin Commission has not yet determined the length of this conduit, within the limits authorized by section 5, and hence no estimate of its expense was possible; that the taking of lands authorized by section 6 had not yet been completed, and it was obviously impossible to estimate the expense of takings and the damages which may be recovered therefor; that the additional dredging in the basin for deepening the channel to Bracket's Wharf, which may be required by the

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War Department of the United States, had not been contracted for, nor the cost of it estimated; and that a considerable amount of filling, required in connection with the construction of the dam and the preservation of public health around the basin, had not been contracted for, nor any definite estimate of its cost made.

After careful consideration of the evidence and the arguments of counsel, the commissioners for apportionment are of the opinion that the work in connection with the Charles River Dam and Basin has not yet progressed far enough, and that sufficient facts are not now obtainable to enable them at the present time to make a just and equitable determination of the portion of the total amount expended for construction under sections 3, 4, 5 and 6 to be apportioned "to the cities of Boston and Cambridge as the cost of removal of Craigie Bridge and the construction of a suitable bridge in place thereof," and to make a just and equitable apportionment "of the cost of construction of the Metropolitan Park System," by considering and treating as a part thereof the remainder of the "total amount expended for construction under" said chapter 465.

They are also of the opinion that they cannot make an intelligent apportionment of the expense of maintaining the Metropolitan Parks System by including the expense of maintenance incurred under sections 1 and 8, both inclusive, inasmuch as no such expenses have been incurred, and the amount of them in connection with the character and use of the constructions would be special circumstances, to be given weight in an apportionment.

These conclusions were unanimously agreed to by the representatives of all persons taking part in the hearings, including the city solicitors of Boston and Cambridge and many other cities and towns in the Metropolitan Parks District, and they requested that the matter be left open for future consideration.

The commissioners for apportionment, therefore, report to the court that they have not included in the preceding portions of this report any part of the expense, either of construction or maintenance, authorized by chapter 465 of the laws of 1903; and that, in their opinion, the matter should be considered at some time in the future, when the necessary information may have become obtainable.

ARTHUR P. RUGG,
JAMES F. JACKSON,
JOHN J. FLAHERTY,
Commissioners for Apportionment.

SEPT. 21, 1905.

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COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.
No. 9159.

In the matter of the petition of William B. de las Casas *et al.*, Metropolitan Park Commissioners, for appointment of commissioners to determine payments by cities and towns under Acts of 1899, chapter 419.

DECREE ACCEPTING AWARD OF COMMISSIONERS.

This cause came on to be heard on motion of the petitioners for the acceptance of the award of the commissioners at this sitting, and was argued by counsel; and it appearing that notice of the motion of the petitioners for the acceptance of the award of the commissioners had been published in accordance with the order of the court, thereupon, upon consideration thereof, it is ordered, adjudged and decreed that the report of the commissioners, Arthur P. Rugg, James F. Jackson and John J. Flaherty, be and the same hereby is accepted.

By the court,

JOHN NOBLE,
Clerk.

NOV. 10, 1905.

WELLINGTON BRIDGE APPORTIONMENT, UNDER CHAPTER 491 OF THE ACTS OF THE LEGISLATURE FOR THE YEAR 1901.

COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY

In the matter of the petition of William B. de las Casas *et al.*, Metropolitan Park Commissioners, for appointment of commissioners to determine payments by cities and towns under Acts of 1901, chapter 491.

PETITION.

Respectfully represent William B. de las Casas, Edwin B. Haskell, Edwin U. Curtis, David N. Skillings and Ellerton P. Whitney, your petitioners: —

That they constitute the Board of Metropolitan Park Commissioners, duly established under and by virtue of an act of the

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Legislature of Massachusetts, entitled "An Act to establish a Metropolitan Park Commission," being chapter 407 of the acts passed in the year A.D. 1893, and acting under said act and acts in amendment thereof and in addition thereto.

That by section 1 of chapter 491 of the Acts of 1901 (a copy of which act is hereto annexed, marked "Exhibit A") the Metropolitan Park Commission was required to build a bridge with a suitable draw and with suitable approaches across Mystic River, between the city of Somerville and the city of Medford, at or near the site of the so-called Middlesex Avenue bridge.

That by section 2 of said act it was provided that the cost of the bridge "shall not exceed the sum of two hundred thousand dollars, and shall be paid in the manner hereinafter provided, in part by such cities and towns in the county of Middlesex as shall be found to be specially benefited by the use of said bridge for highway purposes, and in part by the Metropolitan Parks District, to such extent as said district shall be found to be benefited by the use of the bridge for park purposes, and in the proportion to be determined by a special commission appointed as hereinafter provided."

That your petitioners have built the bridge, with a suitable draw and suitable approaches, upon plans approved by the county commissioners of Middlesex County, at a cost of less than the sum of $200,000, as required by said act, and that said bridge and its approaches were completed on the seventh day of December, A.D. 1904.

That in and by sections 6 and 7 of said chapter 491 it is provided that, in order to determine which of said cities and towns in the county of Middlesex are specially benefited by the use of said bridge for highway purposes, and the extent of such benefit, and to what extent the Metropolitan Parks District by the use of said bridge for park purposes, and to determine in proportion to such benefits the part of the cost of said bridge and approaches to be paid by each of said cities and towns and by the Metropolitan Parks District, and in order to determine the proportion in which said cities and towns, or any of them, and said district shall bear the cost of the maintenance of said bridge, there shall be three commissioners appointed by this honorable court, upon petition of this Board.

That for the purpose of carrying out the provisions of said act it is necessary and expedient that said commissioners be appointed by the court, as aforesaid.

They therefore pray that after such notice as this honorable court

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shall order, if any, there may be three commissioners appointed, in the manner and for the purposes, and with all the rights, powers, privileges, duties and obligations in said act of 1901 mentioned or referred to.

WILLIAM B. DE LAS CASAS,
EDWIN B. HASKELL,
EDWIN U. CURTIS,
DAVID N. SKILLINGS,
ELLERTON P. WHITNEY,
Board of Metropolitan Park Commissioners.

ARTHUR W. DEGOOSH,
Assistant Attorney-General, of Counsel.

EXHIBIT A.

[ACTS OF 1901, CHAPTER 491.]

AN ACT TO DIRECT THE METROPOLITAN PARK COMMISSION TO CONSTRUCT A BRIDGE OVER THE MYSTIC RIVER BETWEEN THE CITIES OF SOMERVILLE AND MEDFORD.

Be it enacted, etc., as follows:

SECTION 1. The metropolitan park commission shall build a bridge, with a suitable draw and with suitable approaches, across the Mystic river between the city of Somerville and the city of Medford, at or near the site of the so-called Middlesex Avenue bridge, subject to the provisions of chapter nineteen of the Public Statutes. The plans of said bridge shall be approved by the county commissioners of Middlesex county, and the bridge shall be constructed and maintained for the joint use of the highways of said cities and the metropolitan reservations, roads and boulevards along and near said river in said cities, and the said board shall maintain and operate the same for any purposes for which either the said highways or the said park roads may be used.

SECTION 2. The cost of the bridge and approaches thereto shall not exceed the sum of two hundred thousand dollars, and shall be paid in the manner hereinafter provided, in part by such cities and towns in the county of Middlesex as shall be found to be specially benefited by the use of said bridge for highway purposes, and in part by the metropolitan parks district, to such extent as said district shall be found to be benefited by the use of the bridge for park purposes, and in the proportion to be determined by a special commission appointed as hereinafter provided.

SECTION 3. For the purpose of carrying out the provisions of this act the said board shall have, in addition to the powers hereby conferred, the same powers and shall be subject to the same duties and liabilities in regard to said bridge as are provided in regard to roads and highways by chapter two hundred and eighty-eight of the acts of the year eighteen hundred and ninety-four and acts in addition thereto and in amendment

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thereof, or by any other provisions of law applicable thereto, except as herein otherwise provided, and in addition thereto said board may remove the existing Middlesex Avenue bridge, so-called, or use any part thereof for the new bridge.

SECTION 4. The said board shall have authority to grant locations to street railways in and over said bridge, upon the same terms and conditions upon which it is now authorized to grant locations to street railways within the roads, boulevards, parks and reservations in its care and control, under the provisions of chapter four hundred and thirteen of the acts of the year nineteen hundred, and any moneys received from said grants shall be applied to the cost of or to the care and maintenance of the new bridge.

SECTION 5. To meet the expenses incurred under this act the treasurer and receiver-general is hereby authorized, with the approval of the governor and council, to issue scrip or certificates of indebtedness to an amount not exceeding two hundred thousand dollars, as an addition to the amounts already authorized under the provisions of chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three and acts in addition thereto and in amendment thereof, and as part of the Metropolitan Parks Loan. Such scrip or certificates of indebtedness shall be issued as registered bonds, and shall bear interest at a rate not exceeding four per cent. per annum, payable semi-annually, on the first days of January and July of each year.

SECTION 6. The supreme judicial court sitting in equity shall, upon application of said board and after such notice as it may order, appoint three commissioners, who shall, after due notice and hearing, in such manner as they shall deem just and equitable, determine *which of said cities and towns in the county of Middlesex are especially benefited by the use of said bridge for highway purposes*, and the extent of such benefit, and *to what extent the metropolitan parks district is benefited by the use of said bridge for park purposes*, and shall further determine in proportion to such benefits the part of the cost of said bridge and approaches to be paid by each of said cities and towns and by the metropolitan parks district, and shall return their award into said court, and when the same has been accepted by said court it shall be a final adjudication of all matters herein referred to said commissioners, and shall be binding on all parties; and in like manner said commissioners shall determine and file their award as to the payment of the cost of maintenance of said bridge, and determine the proportion in which said cities and towns or any of them and said district shall bear the same.

SECTION 7. Upon the filing and acceptance of said awards the treasurer and receiver-general of the Commonwealth shall estimate and determine the amount to be paid in accordance with said award by each of said cities and towns as their proportion of the cost of said bridge, and shall include one-fifth part thereof with interest at the current rates in the sum charged to each of said cities and towns in the apportionment and assessment of its state tax for the succeeding five years, until the sum to be paid by such city or town has been fully paid. The sums thus paid by said cities and towns shall be credited and added to the Metropolitan

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Parks Loan Sinking Fund. In like manner the treasurer and receiver-general shall estimate and determine the amount to be paid in each year by any city or town according to the award of said commissioners for the care and maintenance of said bridge, and shall include the same in the annual state tax of such city or town, and the sums thus collected shall be credited to and paid into the funds available by the metropolitan park commission for the maintenance of said bridge, and may be expended by them for that purpose, in addition to any loans or appropriations authorized for park purposes.

SECTION 8. This act shall take effect upon its passage. [*Approved June 13, 1901.*

COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.

In the matter of the petition of William B. de las Casas and others, Metropolitan Park Commissioners, for the appointment of commissioners to determine payments by cities and towns under Acts of 1901, chapter 491.

DECREE.

And now, upon the above-entitled petition, it appearing to the court that due notice thereof was given to all cities and towns, respondents, according to the order of the court, and after due hearing thereof, no person objecting, it is ordered that Arthur P. Rugg of Worcester, James F. Jackson of Fall River and John J. Flaherty of Gloucester be and they hereby are appointed commissioners under section 6 of chapter 491 of the Acts of the year 1901, to determine which of the cities and towns in the county of Middlesex are specially benefited by the use of the bridge, which is the subject of said act, for highway purposes, and to what extent the Metropolitan Parks District is benefited by the use of the bridge for park purposes, determine and make award the proportions of the cost of said bridge and approaches which each shall pay, and also to determine and make award of the proportions in which each of said cities and towns shall pay the cost of maintenance of said bridge, and to do and perform all of the other duties prescribed for them by said act, and to exercise all the powers thereby and by law reposed upon the said commissioners as provided for by said act.

By the court,

WALTER F. FREDERICK,
Assistant Clerk.

FEB. 21, 1905.

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COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.
No. 9158.

William B. de las Casas *et al.*, petitioners, under chapter 491, Acts of 1901.

REPORT OF THE DETERMINATION AND AWARD OF COMMISSIONERS.

The undersigned commissioners, Arthur P. Rugg, James F. Jackson and John J. Flaherty, duly appointed in the above cause to make a determination and award as to an apportionment of the cost of the construction and maintenance of the Wellington, or Middlesex Avenue, Bridge, built across the Mystic River between the cities of Somerville and Medford, under the provisions of chapter 491, Acts of 1901, have attended to their duties, and respectfully present the following report of their doings and of their determination and award.

After due notice given to all parties in interest, several hearings were held, at which opportunity was given to the petitioners and to all cities and towns and to all other persons interested in the matter to be fully heard, such hearings having been held at Boston on the sixteenth day of March, and twentieth, twenty-first, twenty-second, twenty-sixth and twenty-seventh days of April. Said notice, with the return of service thereon, is filed herewith. A view of this bridge and of the highways connecting therewith was taken. The commissioners also met for conference on the third days of March and May. After the submission of all the evidence and arguments which parties desired to present, and upon full consideration thereof, the commissioners make the following findings and award: —

1. They find that, under the authority conferred by chapter 187, Acts of 1869, a bridge for highway purposes alone was constructed, known as the Middlesex Avenue Bridge, which spanned the river at substantially the same place as the present bridge. Section 3, chapter 491, Acts of 1901, authorized the Metropolitan Park Commission to remove this old bridge, or use any part of it for the new bridge. The old was somewhat narrower than the new structure, and from age and use its strength and durability had become impaired. No street railway track had ever been laid upon it, and it was not strong enough, without extensive and expensive repairs, to bear street railway traffic. The Metropolitan Park Commission acted upon the authority conferred by section 3 of said chapter 491, and removed the old bridge, after using it until the new one was completed. The new bridge was constructed during the year

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1903, at a total expense, including its approaches, of $184,261.61. The annual expense of maintenance of the bridge has since been approximately $2,661.

2. The commissioners are of the opinion and find that the history of the taking and removal of the Middlesex Avenue Bridge (section 3, chapter 491, Acts of 1901) and the building of this bridge, the type and dimensions of the structure, the uses now made of it and those which will in the future in all probability be made of it, the relation which it bears to the surrounding cities and towns and to the part of the Metropolitan Parks District lying north of Boston, all go to show that the benefits to be received from the bridge and its approaches, so far as such benefits may be measured, are shared in equal proportion by those who use and will use the bridge for the ordinary highway purposes, and by those who use and will use it in connection with travel to and from important park reservations within the Metropolitan Parks District. In accordance with these views, they determine that the Metropolitan Parks District is benefited by the use of said bridge for park purposes to the extent of one-half its cost for construction; and they apportion upon the Metropolitan Parks District one-half, or 50 per cent., of the expense of construction of the bridge with its approaches, and the other half upon the cities and towns hereinafter named, which determination is to their minds just and equitable.

3. They are of the opinion and find that the present and future uses of the Wellington Bridge for highway purposes are of special benefit to the cities of Somerville, Medford and Malden, and the towns of Stoneham and Reading. The view and the oral and written evidence conclusively prove that, besides the present uses of this highway, there will be an additional and very important use of it in connection with a proposed street railway service, for which provision has been made in the construction of the bridge and approaches, and for the inauguration of which steps have already been taken by companies which expect to perform this service. The value of such street railway facilities to the town of Stoneham, and in a smaller degree to the town of Reading, constitute in large part the basis for the finding that these towns are to receive special benefit from the new bridge. The cities of Somerville, Medford and Malden receive material benefit from the improved means of communication with each other, in the increased convenience for mutual business relations between these communities, and, especially in the case of the two cities last named, a direct benefit in the probably larger value of lands at present unoccupied.

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Accordingly, the commissioners believe it to be just and equitable, and find that the extent of the special benefits received by these cities and towns are in proportion to the percentages which follow, and which represent the manner in which they apportion among them the one-half, or 50 per cent., of the cost of construction of this bridge and its approaches, not hereinbefore apportioned upon the Metropolitan Parks District: —

	Per Cent.
Somerville,	12½
Medford,	19
Malden,	14
Stoneham,	3½
Reading,	1
	50

The commissioners are unable to find, upon the evidence presented or from their own observation, any difference in the effect of the various uses of this highway upon the bridge and its approaches. The same considerations which govern their determination as to the division of the cost of the construction of the bridge and its approaches lead to the same conclusions as to the division of the cost of the maintenance of the bridge. Taking into consideration the present and prospective uses of said bridge, it is just and equitable, and they therefore in like manner, and for the reasons hereinbefore stated, determine the proportion in which said cities and towns and said Metropolitan Parks District shall bear the cost of maintenance of said bridge as follows: —

	Per Cent.
Somerville,	12½
Medford,	19
Malden,	14
Stoneham,	3½
Reading,	1
Metropolitan Parks District,	50
	100

ARTHUR P. RUGG,
JAMES F. JACKSON,
JOHN J. FLAHERTY,
Commissioners.

SEPT. 16, 1905.

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COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. SUPREME JUDICIAL COURT. IN EQUITY.
No. 9158.

In the matter of the petition of William B. de las Casas *et al.*, Metropolitan Park Commissioners, for appointment of commissioners to determine payments by cities and towns under Acts of 1901, chapter 491.

DECREE ACCEPTING AWARD OF COMMISSIONERS.

This cause came on to be heard on motion of the petitioners for the acceptance of the award of the commissioners at this sitting, and was argued by counsel; and, it appearing that notice of the motion of the petitioners for the acceptance of the award of the commissioners had been published and served in accordance with the order of the court, thereupon, upon consideration thereof, it is ordered, adjudged and decreed that the report of the commissioners, Arthur P. Rugg, James F. Jackson and John J. Flaherty, be and the same hereby is accepted.

By the court,

JOHN NOBLE,
Clerk.

NOV. 10, 1905.

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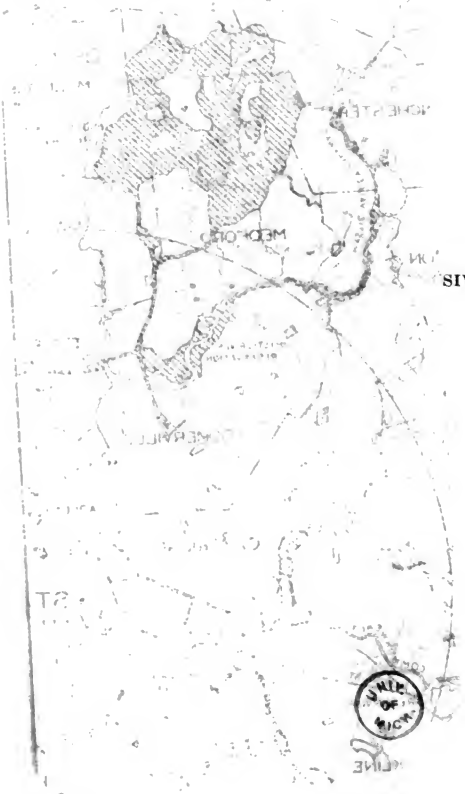


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TWENTY-SECOND ANNUAL REPORT

OF THE

CIVIL SERVICE COMMISSIONERS

OF

MASSACHUSETTS.

FROM OCT. 1, 1904, TO SEPT. 30, 1905, INCLUSIVE.

BOSTON:
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Approved by
The State Board of Publication.

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CONTENTS.

	PAGE
Names of Board, Officers and Examiners,	5-8
REPORT,	9-16
Appointments,	14, 15
Examinations,	14
Labor Service,	15
APPENDIX,	19-40
Civil Service Law,	62-79
Examination Papers,	139-190
Forms for appointing Officers,	191
Instructions to Applicants,	117
Regulations,	103-111
Report of Chief Examiner and Secretary,	19-40
Report of Registrar of Labor, Boston,	41-45
Report of Registration Clerk, Cambridge,	46-49
Report of Registration Clerk, Everett,	59-61
Report of Registration Clerk, New Bedford,	50-52
Report of Registration Clerk, Newton,	56-58
Report of Registration Clerk, Worcester,	53-55
Rules,	80-102
Schedule of Examinations,	119-138
Special Instructions to Examiners,	112-114

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CIVIL SERVICE COMMISSIONERS.

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FRANK FOXCROFT, CAMBRIDGE.
JOSEPH C. PELLETIER, BOSTON.

Chief Examiner.
HENRY SHERWIN, JAMAICA PLAIN.

Secretary.
WARREN P. DUDLEY, BELMONT.
Office of Civil Service Commissioners, Rooms 151, 152, State House, Boston.

Registrar of Labor, — Labor Office, State House, Boston.
WILLIAM L. HICKS.

Registration Clerk, — Labor Office, City Hall, Cambridge.
HARRY L. LINCOLN.

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Registration Clerk, — Labor Office, City Hall, Newton.
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WILLIAM B. CONNOR.

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Commonwealth of Massachusetts.

To the Honorable the Senate and House of Representatives in General Court assembled.

In pursuance of the provisions of chapter 19 of the Revised Laws, the Civil Service Commissioners have the honor to submit their twenty-second annual report. The period covered by the report extends from Oct. 1, 1904, to Sept. 30, 1905, inclusive.

At the expiration of the term of office in July of Commissioner Charles H. Porter, Mr. Charles Warren was appointed to fill the vacancy. He entered upon the duties of his office July 10, 1905.*

Early in the year the commissioners began a revision of their rules, and on March 14 the revised rules prepared by the commissioners were submitted to the Governor and Council for approval. They were approved in council March 29, and contained, besides many minor changes for the purpose of clearness and conciseness of statement and more orderly arrangement, an extension to cover the following important classes: —

First. — All janitors and engineers and persons having charge of school or other public buildings, or of the heating apparatus thereof, in any city.

Second. — The classification, as class 13 of Schedule B, of architects and architectural draftsmen, and all assistants, under whatever designation, except laborers and mechanics, in the service of the Commonwealth or any city thereof.

Third. — The classification, as class 14 of Schedule B, of electricians, electrical engineers, and all assistants, under whatever designation, above the grade of linemen.

* Commissioner Bentley W. Warren resigned his position as Civil Service Commissioner October 11, and Mr. Joseph C. Pelletier was appointed to fill the vacancy. The commissioners organized on November 10 by the election of Mr. Charles Warren as chairman.

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Fourth. — The classification of the permanent and call fire forces of all cities in the Commonwealth.

In the revised rules the age limit of applicants for the district police force was changed to include persons over twenty-five and under forty years of age.

The commissioners believe that the extension of the rules to the fire service of all cities of the Commonwealth will be of great benefit to the service, and will in its operation commend itself both to the public and to the firemen.

At the present day the demand of the public in all directions is for the "square deal." Appointment to office obtained as a result of open competitive tests, instead of through personal or political favor, is one of the best applications of that sturdy Americanism, "Equal opportunity to all; special privileges to none."

The examinations for the fire service are of a practical nature, the educational features being of the simplest kind, and the greatest weight being given to knowledge of local data and of a fireman's duties, and to experience. Owing to the weight given to the latter, it has been found in practice that applicants who have served as call firemen are likely to attain the highest ranking.

In Boston and certain other cities a strength examination is now given, and by regulation the comparative weight given to the marks for the mental examination and for the strength examination is as 2 to 3. The commissioners intend, so far as is practicable, to extend the strength examinations for firemen to all cities which may ask for the same.

With reference to the statement often made, that civil service examinations are unpractical, the commissioners call attention to the fact that, owing to weights given in marking, questions testing experience and knowledge of the special duties, work or requirements of the office examined for constitute a considerable percentage of examinations. The remainder of the questions are intended to test the general fitness and intelligence of the applicant.

The commissioners are always ready to give consideration to any honest complaints as to instances of unpractical questions. No system of testing men for public office is perfect.

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They believe, however, with President Roosevelt, in his last annual message, that, while "Written competitive examinations do not make an ideal method for filling positions, they do represent an immeasurable advance upon the 'spoils' method, under which outside politicians really make the appointments nominally made by the executive officers, the appointees being chosen by the politicians in question, in the great majority of cases, for reasons totally unconnected with the needs of the service or of the public."

The charge is sometimes made that it is only possible for a man with a high grade or college education to pass the civil service examinations. The following list of occupations of men who have passed such examinations and who are now on the eligible list for firemen and policemen in Boston ought to refute this idea: —

Police Eligibles. — Athletic instructor, blacksmith, boiler maker, boiler maker's helper, butcher, cement finisher, census enumerator, chain maker, coachman, collector, confectioner, contractor's foreman, door moulder, electrotyper, elevator man, engineer (stationary), fireman (member department), foreman hostler, foreman teamster, furniture packer, horseshoer, hostler, janitor, leather weigher, marble worker, meat cutter, mill hand, optician, paver, piano polisher, printer, produce dealer, rectifier, sailor (navy), steam driller, stevedore, 1 each; baggageman, bricklayer, electrician, expressman, freight handler, iron moulder, lamp lighter, machine tender, plasterer, porter, sheet-iron worker, soldier, supervisor, waiter, 2 each; fireman (stationary), painter, shoemaker, watchman, 3 each; brakeman, 4; clerk (grocery), 5; carpenter, plumber, salesman, 6 each; laborer, 10; clerk, 13; teamster and driver, 18; motorman, 35.

Fire Eligibles. — Blacksmith, carpenter, coppersmith's helper, engineer (stationary), horseshoer, marine engineer, steam fitter, telegrapher, 1 each; electrician, printer, 2 each; gas fitter, 3; sailor (navy), 4; machinist, 7; plumber, 14; teamster and driver, 72.

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Publicity.

In accordance with the law and the spirit of the merit system, the examination papers of an applicant, when marked, are open to his inspection, and the records of the commissioners and recommendations of applicants are open to public inspection. The commissioners are also always ready to give consideration to any honest complaint as to alleged injustice or unfairness in the markings of the papers and the general workings of the system.

Lack of Applicants for Examination.

The commissioners find it difficult to establish eligible lists for many positions in the service of the Commonwealth and of the cities, owing to lack of applicants for examination.

With the exception of lists for the clerical, police and fire services, the lists of eligibles for appointment are in many cities small, and frequently entirely lacking. Inability to certify names upon requisition made had led to the necessity for the allowance by the commissioners of provisional appointments of persons who may hold office until the establishment of eligible lists. This situation is to be deplored, as opening the door to many political appointees not selected for fitness or as the result of open competition.

The commissioners feel that it is a public misfortune that there should be any scarcity of candidates for public office. Attention, therefore, is now called to this fact, and persons desiring to be examined for public employment are urged to ascertain from the secretary of the Board, or from the local secretaries in the various cities, the present existence or present size of the lists for the various offices, and to consult the schedule of examinations published in this report.

The commissioners try to give all possible publicity to the dates for examinations, but they are limited in their efforts by their appropriation. They hope that the newspapers of the State may be willing, even more than in the past, to cooperate in publishing items of this kind, which constitute

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really valuable matters of news. They ask the further co-operation of city and town officials in posting in public places the notices of such examinations.

Violations of the Law.

In general, city and State officers have given support to the commissioners in administering the civil service law. In several cities, and notably in some departments of the city of Boston, however, there have been increasing attempts to evade or disregard the law. This has been true of appointments to the labor service in Boston: through false ratings, *i.e.*, by requisitions for various kinds of craftsmen, who on being certified are employed as common laborers, and not on the work called for, a great injustice being thus done to the men registered as common laborers; also through employment of laborers under the false title of "emergency men," without any requisitions whatsoever.

The commissioners have under consideration changes in the regulations applicable to the labor service which will make such violations and evasions more difficult. The commissioners are hampered, however, in the detection of illegal appointments by the lack of appropriations necessary to maintain an office force sufficient to make prompt inspection of pay rolls. Legislation which would effectively require public officials to file periodically sworn pay rolls or returns of the name, the amounts paid for salaries and otherwise, and the nature of the work performed by each person employed, would greatly facilitate the work of the commissioners, and would result in a decrease of padded pay rolls.

In most instances where violations of the law have been discovered, appointing officers have, upon notification thereof, complied with the orders of the commissioners. In some cases, however, the commissioners have found it necessary to take action under section 34 of chapter 19 of the Revised Laws, and to notify city auditors that the payment of compensation to the persons illegally employed must cease; and actions in the nature of a *quo warranto* have been filed by the Attorney-General.

The commissioners ask all citizens of the Commonwealth

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to co-operate with them in the maintenance of the merit system, by notifying them of infractions or evasions of the law on the part of appointing officials, and by otherwise insisting that such officials shall make appointments for merit and fitness alone. Their official oaths, respect for the law and regard for an expressed public opinion ought to prevent violations of the law by appointing officers. If such influences fail, and if resort by the commissioners to the civil statutory procedure shall not prove effective, then a proper co-operation with the commissioners by the district attorneys of the Commonwealth ought to make the civil service law an active statute, scrupulously to be obeyed.

During the period covered by this report there were held 149 general competitive, 1 special competitive and 65 non-competitive examinations.

Of the 65 non-competitive examinations, 53 were for transfer and promotion as provided by the rules; 6 were of applicants for positions as inspectors of plumbing, under chapter 103, section 5, of the Revised Laws, where under the law non-competitive examinations must be held if requested by the appointing power. Of the 6 remaining non-competitive examinations, 4 were in cases where there were no suitable eligible lists, and 2 were for positions where special qualifications were required.

There were 3,010 persons examined for positions in the different grades of the classified service of the State and several cities and towns, of whom 2,228 were men, including 16 veterans, and 782 were women; 1,937 passed the required examinations. Of those examined, 2,760 had been educated in the common schools and 250 appear to have attended college.

During the period covered by the report, 581 men and 168 women received appointments to positions in the public service. Of those appointed, 10 were veterans who had passed the required civil service examination, and 22 were veterans appointed without examination.

The average age of those examined for positions in the service is the same as last year, — about thirty-nine years.

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The Labor Service.

Boston.

In Boston 2,451 persons applied and were registered for employment as laborers or mechanics in the several city departments, of whom 64 were veterans. There were 125 requisitions received and 750 certifications made, including the names of 28 veterans. Of those certified, 292, including 6 veterans, were regularly employed.

Worcester.

In Worcester 837 applicants for labor service, including 34 veterans, were registered. There were 33 requisitions received, upon which 636 certifications were made, including 8 veterans. From these certifications 511 men were employed, including 6 veterans.

Cambridge.

In Cambridge 1,533 persons were registered, including 15 veterans. Fifty-eight requisitions were received, upon which 1,382 certifications were made, including 12 veterans. From these certifications 844 persons were employed, including 10 veterans.

New Bedford.

In New Bedford 204 persons were registered, including 3 veterans. Twenty-four requisitions were received and 71 certifications made, including the name of 1 veteran. From these certifications 36 men were employed, including 1 veteran.

Newton.

In Newton 111 persons were registered. Three requisitions were received, upon which 50 persons were certified, all of whom were employed.

Everett.

In Everett 138 men were registered, including 6 veterans. There were 10 requisitions received and 188 certifications made, including 4 veterans. From these certifications 76 men were employed, including 4 veterans.

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The reports of the secretary, chief examiner, registrar of labor and registration clerks will be found in the Appendix, and contain in detail the figures upon which this report is based.

CHARLES WARREN,
FRANK FOXCROFT,
JOSEPH C. PELLETIER,
Civil Service Commissioners.

DEC. 22, 1905.

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APPENDIX.

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APPENDIX.

EXAMINATIONS AND APPOINTMENTS.

From Oct. 1, 1904, to Sept. 30, 1905, inclusive, there were held for the State and Boston services 67 examinations, as follows: —

COMPETITIVE EXAMINATIONS.

For State clerical service,	2	
For Boston clerical service,	2	
For State stenographer-typewriter service,	2	
For Boston stenographer-typewriter service,	2	
For State prison service,	1	
For Boston prison service,	1	
For metropolitan park police service,	1	
For Boston fire service,	2	
For Boston police service,	2	
For Boston drawtender service,	1	
For State foreman and inspection service,	2	
For Boston foreman and inspection service,	2	
For State sub-foreman service,	2	
For Boston sub-foreman service,	2	
For Boston school janitor service,	1	
For Boston schoolhouse custodian service,	1	
For State civil engineering service,	2	
For Boston civil engineering service,	2	
		30

NON-COMPETITIVE EXAMINATIONS.

For State clerical service,	1	
For Boston clerical service,	1	
For State clerical promotion,	2	
For Boston clerical promotion,	1	
For metropolitan park police promotion,	1	
For Boston fire promotion,	10	
For Boston police promotion,	19	
For Boston drawtender promotion,	1	
For Boston superintendent service,	1	
		37

There have been held 148 examinations for original appointments and promotions in the clerical, stenographer-typewriter, police, drawtender, foreman and inspection,

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sub-foreman, school janitor, fire, superintendent and civil engineering services of cities other than Boston, and for plumbing inspection service in cities and towns, under chapter 103 of the Revised Laws, as follows: —

	Number of Examinations.	Number examined.	
Beverly: —			
Police service,	1	2	
Foreman and inspection service,	2	14	
Civil engineering service,	2	9	
			25
Brockton: —			
Clerical service,	1	2	
Police service,	1	11	
Police promotion,	1	1	
Foreman and inspection service,	1	4	
Civil engineering service,	1	1	
			19
Brookline: —			
Clerical service,	1	2	
Police service,	1	17	
Police promotion,	2	2	
Fire service,	1	8	
Fire promotion,	1	1	
			30
Cambridge: —			
Clerical service,	1	52	
Police service,	1	41	
Police promotion,	1	1	
Drawtender service,	1	6	
Foreman and inspection service,	2	10	
Sub-foreman service,	1	7	
School janitor service,	1	12	
Fire service,	1	20	
Fire promotion,	2	24	
Civil engineering service,	1	4	
			177
Chelsea: —			
Health inspection service,	1	4	
Police service,	1	14	
			18
Chicopee: —			
Police service,	1	7	
			7
Everett: —			
Clerical service,	1	3	
Police service,	1	2	
Foreman and inspection service,	1	1	
			6

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	Number of Examinations.	Number examined.	
Fall River: —			
Clerical service,	1	21	
Police service,	1	33	
Police promotion,	1	1	
Foreman and inspection service,	1	3	
			58
Fitchburg: —			
Clerical service,	1	17	
Police service,	1	3	
Foreman and inspection service,	1	3	
Civil engineering service,	1	1	
			24
Gloucester: —			
Clerical service,	2	9	
Police service,	1	3	
Foreman and inspection service,	1	9	
Superintendent service,	1	7	
			28
Haverhill: —			
Clerical service,	1	4	
Police service,	1	8	
Civil engineering service,	2	3	
			15
Holyoke: —			
Clerical service,	1	6	
Stenographer-typewriter service,	1	5	
Police service,	1	20	
Foreman and inspection service,	2	7	
School janitor service,	1	5	
			43
Hyde Park: —			
Police service,	2	6	
Police promotion,	2	2	
			8
Lawrence: —			
Clerical service,	1	5	
Police service,	1	5	
Foreman and inspection service,	2	13	
			23
Lowell: —			
Clerical service,	1	28	
Stenographer-typewriter service,	1	12	
Police service,	1	30	
Foreman and inspection service,	2	28	
School janitor service,	1	13	
			111
Lynn: —			
Clerical service,	1	8	
Police service,	1	29	
Foreman and inspection service,	1	2	
Foreman promotion,	1	1	
			40

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	Number of Examinations.	Number examined.	
Malden: —			
Clerical service,	1	4	
Stenographer-typewriter service,	1	1	
Police service,	2	6	
Foreman and inspection service,	1	1	
School janitor service,	1	3	
Fire service,	1	9	
			24
Medford: —			
Clerical service,	1	3	
Police service,	1	4	
Civil engineering service,	1	1	
			8
Milton: —			
Plumbing inspection service,	2	2	
			2
New Bedford: —			
Clerical service,	1	9	
Stenographer-typewriter service,	1	6	
Police service,	1	23	
Foreman and inspection service,	2	3	
Fire service,	1	12	
			53
Newburyport: —			
Police service,	1	4	
Foreman and inspection service,	1	6	
			10
Newton: —			
Clerical service,	1	5	
Police service,	1	6	
Police promotion,	1	1	
Civil engineering service,	1	1	
			13
North Adams: —			
Superintendent service,	1	6	
			6
Northampton: —			
Clerical service,	1	1	
Police service,	1	3	
			4
Pittsfield: —			
Clerical service,	1	15	
Plumbing inspection service,	4	4	
Police service,	4	17	
Police promotion,	2	2	
			38

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	Number of Examinations.	Number examined.	
Quincy: —			
Police service,	1	9	
Police promotion,	1	1	
Foreman and inspection service,	1	1	
School janitor service,	1	1	
			12
Revere: —			
Police service,	1	1	
			1
Salem: —			
Clerical service,	1	3	
Police service,	1	4	
Police promotion,	1	1	
Foreman and inspection service,	1	1	
			9
Somerville: —			
Clerical service,	1	28	
Police service,	1	20	
Foreman and inspection service,	1	3	
Fire service,	1	8	
Fire promotion,	2	2	
			61
Springfield: —			
Clerical service,	1	10	
Police service,	1	19	
Foreman and inspection service,	2	11	
School janitor service,	1	11	
Civil engineering service,	2	3	
			54
Taunton: —			
Clerical service,	1	2	
Police service,	1	13	
Police promotion,	1	1	
Civil engineering service,	2	2	
			18
Waltham: —			
Police service,	1	9	
Sub-foreman service,	1	1	
			10
Woburn: —			
Clerical promotion,	1	1	
			1
Worcester: —			
Clerical service,	1	27	
Police service,	1	32	
Foreman and inspection service,	1	16	
Civil engineering service,	2	5	
			80
			1,036

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The whole number of persons examined for original appointments and promotions in the first division is as follows: —

For clerical service,	1,035
For clerical promotion,	4
For plumbing inspection service in cities and towns,	6
For stenographer-typewriter service,	194
For prison service,	54
For metropolitan park police service,	58
For metropolitan park police promotion,	1
For fire service,	280
For fire promotion,	37
For police service,	639
For police promotion,	32
For drawtender service,	30
For drawtender promotion,	1
For foreman and inspection service,	241
For foreman and inspection promotion,	1
For sub-foreman service,	38
For school janitor service,	120
For schoolhouse custodian service,	2
For superintendent service,	14
For civil engineering service,	223
	3,010

The whole number passed is as follows: —

For clerical service, 567, or 54 79 per cent. of those examined.
For clerical promotion, 4, or 100 per cent. of those examined.
For plumbing inspection service in cities and towns, 4, or 66.67 per cent. of those examined.
For stenographer-typewriter service, 127, or 65.47 per cent. of those examined.
For prison service, 43, or 79.63 per cent. of those examined.
For metropolitan park police service, 33, or 56.90 per cent. of those examined.
For metropolitan park police promotion, 1, or 100 per cent. of those examined.
For fire service, 181, or 64.65 per cent. of those examined.
For fire promotion, 35, or 94.59 per cent. of those examined.
For police service, 435, or 68.08 per cent. of those examined.
For police promotion, 31, or 96.88 per cent. of those examined.
For drawtender service, 26, or 86.67 per cent. of those examined.
For drawtender promotion, 1, or 100 per cent. of those examined.
For foreman and inspection service, 187, or 77.60 per cent. of those examined.
For foreman and inspection promotion, 1, or 100 per cent. of those examined.
For sub-foreman service, 27, or 71 06 per cent. of those examined.

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For school janitor service, 67, or 55.84 per cent. of those examined.
For schoolhouse custodian service, 2, or 100 per cent. of those examined.
For superintendent service, 10, or 71.43 per cent. of those examined
For civil engineering service, 155, or 69.51 per cent. of those examined.

The whole number of persons appointed from the eligible lists is as follows: —

In the clerical service,	171	
By promotion in the clerical service,	7	
In the plumbing inspection service in cities and towns,	4	
In the stenographer-typewriter service,	33	
In the prison service,	11	
In the metropolitan park police service,	12	
By promotion in the metropolitan park police service,	1	
In the district police service,	2	
In the fire service,	58	
By promotion in the fire service,	28	
In the police service,	198	
By promotion in the police service,	37	
In the drawtender service,	15	
By promotion in the drawtender service,	1	
In the foreman and inspection service,	66	
By promotion in the foreman and inspection service,	3	
In the sub-foreman service,	13	
In the school janitor service,	23	
In the schoolhouse custodian service,	1	
In the superintendent service,	3	
In the civil engineering service,	36	
By promotion in the civil engineering service,	26	
		749

The average age of all the persons examined is about thirty-nine years.

Of the 1,937 persons who passed the examinations, 196 were college educated.

The whole number of veterans who passed examinations for original appointment is 8; the whole number of original appointments of examined veterans is 10.

The whole number of unexamined veterans appointed is 22.

Following are the figures on which this statement is based: —

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COMMONWEALTH SERVICE.

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
State clerical service,	2	-	1	229	3	378	97	-	220	9	-	96	5	29.00	-	25.50	25.65	60.00	25.31	257	60	269	24
State clerical promotion,	-	-	2	1	-	1	1	-	1	1	-	1	-	32.00	-	-	-	-	-	2	-	-	-
State stenographer-typewriter service.	2	-	-	12	-	116	9	-	82	-	-	25	-	27.78	-	24.56	19.67	-	21.59	90	1	36	1
State prison service,	1	-	-	39	1	-	32	-	-	3	-	-	-	34.28	-	-	38.29	57.00	-	32	-	8	-
Metropolitan park police service,	1	-	-	57	1	-	32	1	-	11	1	-	-	29.72	30.00	-	32.68	-	-	33	-	24	1
Metropolitan park police promotion.	-	-	1	1	-	-	1	-	-	1	-	-	-	38.00	-	-	-	-	-	1	-	-	-
District police service,	-	-	-	-	-	-	-	-	-	2	-	-	3	-	-	-	-	-	-	-	-	-	-
State foreman and inspection service.	2	-	-	18	-	-	11	-	-	2	-	-	-	37.82	-	-	35.86	-	-	9	2	7	-
State sub-foreman service,	2	-	-	4	-	-	3	-	-	-	-	-	-	29.00	-	-	47.00	-	-	2	1	1	-
State civil engineering service,	2	-	-	144	-	-	112	-	-	25	-	-	-	24.16	-	-	22.41	-	-	27	85	26	6
State civil engineering promotion,	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-
	12	-	4	505	5	495	298	1	303	64	1	122	8	31.31	30.00	25.03	31.65	58.50	23.45	453	149	371	32
	16			1,005			602			187			8	28.78			37.87			602		403	

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Boston Service.

Boston clerical service,	2	-	1	91	-	70	36	-	31	14	1	-	1	26.81	-	24.39	29.02	-	23.13	64	3	86	8
Boston clerical promotion,	-	-	1	1	-	-	1	-	-	4	-	-	-	21.00	-	-	-	-	-	1	-	-	-
Boston stenographer-typewriter service.	2	-	-	7	-	35	5	-	18	2	-	2	-	25.40	-	27.00	27.50	-	21.65	20	3	19	-
Boston prison service,	1	-	-	14	-	-	11	-	-	8	-	-	-	37.82	-	-	33.67	-	-	11	-	3	-
Boston fire service,	2	-	-	223	-	-	143	-	-	42	-	-	1	25.06	-	-	24.80	-	-	143	-	80	-
Boston fire promotion,	-	-	10	10	-	-	10	-	-	17	-	-	-	37.90	-	-	-	-	-	10	-	-	-
Boston police service,	2	-	-	238	-	-	142	-	-	62	-	-	-	28.60	-	-	28.55	-	-	141	1	95	1
Boston police promotion,	-	-	19	19	-	-	18	-	-	18	-	-	-	38.50	-	-	39.00	-	-	18	-	1	-
Boston drawtender service,	1	-	-	24	-	-	20	-	-	7	1	-	-	31.70	-	-	32.50	-	-	20	-	4	-
Boston drawtender promotion,	-	-	1	1	-	-	1	-	-	1	-	-	-	45.00	-	-	-	-	-	1	-	-	-
Boston foreman and inspection service.	2	-	-	83	-	-	69	-	-	23	-	-	-	33.87	-	-	35.64	-	-	66	3	13	1
Boston foreman and inspection promotion.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Boston sub-foreman service,	2	-	-	26	-	-	21	-	-	6	-	-	-	35.86	-	-	43.60	-	-	20	1	5	-
Boston school janitor service,	1	-	-	70	2	3	42	-	1	15	-	-	1	33.67	-	37.00	37.18	58.00	34.00	43	-	32	-
Boston schoolhouse custodian service.	1	-	-	2	-	-	2	-	-	1	-	-	-	31.50	-	-	-	-	-	2	-	-	-
Boston superintendent service,	-	-	1	1	-	-	1	-	-	1	-	-	-	51.00	-	-	-	-	-	1	-	-	-
Boston civil engineering service,	2	-	-	49	-	-	37	-	-	7	-	-	-	22.07	-	-	22.45	-	-	11	16	16	6
Boston civil engineering promotion.	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-
	18	-	33	859	2	108	549	-	50	242	2	2	3	32.86	-	29.46	32.17	58.00	26.26	572	27	354	16
	51			969			599			246			3	31.16			38.81			599		370	

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Clerical, Stenographer-typewriter, Prison, Drawtender, Foreman, Inspection, Sub-foreman, School Janitor, Fire, Superintendent, and Civil Engineering Services, Cities Other than Boston, and Inspectors of Plumbing in Cities and Towns, under Chapter 103 of the Revised Laws.

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons Appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
Beverly, foreman and inspection,	2	–	–	14	–	–	12	–	–	5	–	–	–	37.08	–	–	43.50	–	–	12	–	2	–
Beverly, sub-foreman,	–	–	–	–	–	–	–	–	–	2	1	–	–	–	–	–	–	–	–	–	–	–	–
Beverly, civil engineering,	2	–	–	9	–	–	2	–	–	–	–	–	–	21.00	–	–	22.14	–	–	1	1	7	–
Brockton, clerical,	1	–	–	–	–	2	–	–	2	–	–	2	–	–	–	19.50	–	–	–	2	–	–	–
Brockton, foreman and inspection,	1	–	–	4	–	–	3	–	–	2	–	–	–	30.33	–	–	68.00	–	–	3	–	1	–
Brockton, civil engineering,	1	–	–	1	–	–	1	–	–	1	–	–	–	32.00	–	–	–	–	–	1	–	–	–
Brookline, clerical,	1	–	–	1	–	1	1	–	1	1	–	–	–	22.00	–	18.00	–	–	–	2	–	–	–
Brookline, fire,	1	–	–	8	–	–	5	–	–	3	–	–	–	25.60	–	–	25.67	–	–	5	–	3	–
Brookline, fire promotion,	–	–	1	–	–	1	1	–	–	2	–	–	–	36.00	–	–	–	–	–	1	–	–	–
Brookline, civil engineering promotion.	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Cambridge, clerical,	1	–	–	36	–	16	5	–	14	3	–	6	–	25.40	–	26.43	28.00	–	26.00	16	3	32	1

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CLERICAL, STENOGRAPHER-TYPEWRITER, PRISON, DRAWTENDER, ETC. — *Continued.*

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
Haverhill, civil engineering,	2	-	-	3	-	-	1	-	-	1	-	-	-	21.00	-	-	20.00	-	-	1	-	2	-
Holyoke, clerical,	1	-	-	3	-	3	-	-	3	1	-	-	-	-	-	22.67	21.33	-	-	2	1	3	-
Holyoke, stenographer-typewriter,	1	-	-	-	-	5	-	-	4	-	-	-	-	-	-	21.00	-	-	20.00	4	-	1	-
Holyoke, foreman and inspection,	2	-	-	7	-	-	6	-	-	3	-	-	-	44.00	-	-	50.00	-	-	6	-	1	-
Holyoke, school janitor,	1	-	-	5	-	-	2	-	-	-	-	-	-	44.50	-	-	30.67	-	-	2	-	3	-
Lawrence, clerical,	1	-	-	2	-	3	2	-	3	-	-	-	-	22.00	-	20.67	-	-	-	5	-	-	-
Lawrence, foreman and inspection.	2	-	-	12	1	-	5	1	-	2	1	-	-	33.80	56.00	-	29.86	-	-	6	-	7	-
Lowell, clerical,	1	-	-	18	-	10	10	-	8	1	-	-	-	26.00	-	25.88	26.50	-	24.00	17	1	9	1
Lowell, stenographer-typewriter,	1	-	-	1	-	11	1	-	5	-	-	1	-	18.00	-	24.20	-	-	19.67	6	-	6	-
Lowell, foreman and inspection,	2	-	-	28	-	-	24	-	-	5	-	-	-	32.58	-	-	35.00	-	-	24	-	4	-
Lowell, school janitor,	1	-	-	13	-	-	4	-	-	2	-	-	-	35.50	-	-	39.00	-	-	4	-	9	-
Lynn, clerical,	1	-	-	1	-	7	-	-	6	-	-	3	-	-	-	22.17	23.00	-	28.00	6	-	2	-
Lynn, foreman and inspection,	1	-	-	2	-	-	1	-	-	1	-	-	1	41.00	-	-	33.00	-	-	1	-	1	-

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Clerical, Stenographer-typewriter, Prison, Drawtender, etc. — *Concluded.*

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
Northampton, clerical,	1	–	–	–	–	1	1	–	–	–	–	1	–	–	–	31.00	–	–	–	–	1	–	–
Pittsfield, clerical,	1	–	–	1	–	14	1	–	13	–	–	2	–	21.00	–	24.85	–	–	26.00	13	1	1	–
Pittsfield, plumbing inspection,	–	–	4	4	–	–	2	–	–	2	–	–	–	31.00	–	–	38.00	–	–	2	–	2	–
Quincy, foreman and inspection,	1	–	–	1	–	–	1	–	–	–	–	–	–	49.00	–	–	–	–	–	1	–	–	–
Quincy, school janitor,	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	51.00	–	–	–	–	1	–
Quincy, fire,	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–
Salem, clerical,	1	–	–	–	–	3	–	–	3	–	–	1	–	–	–	25.33	–	–	–	3	–	–	–
Salem, foreman and inspection,	1	–	–	1	–	–	1	–	–	–	–	–	–	39.00	–	–	–	–	–	1	–	–	–
Salem, civil engineering,	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Somerville, clerical,	1	–	–	7	–	21	6	–	21	1	–	7	–	28.00	–	23.33	36.00	–	–	22	5	1	–
Somerville, foreman and inspection.	1	–	–	3	–	–	3	–	–	–	–	–	–	30.00	–	–	–	–	–	3	–	–	–
Somerville, fire,	1	–	–	8	–	–	8	–	–	–	–	–	–	26.25	–	–	–	–	–	8	–	–	–
Somerville, fire promotion,	–	–	2	2	–	–	2	–	–	3	–	–	–	42.50	–	–	–	–	–	2	–	–	–

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Springfield, clerical,	1	-	-	2	-	8	2	-	7	1	-	8	-	35.00	-	27.14	-	31.00	8	1	1	-	-	-	-	-	-	-	-	-	-
Springfield, foreman and inspection.	2	-	-	11	-	8	-	-	1	-	-	-	-	34.00	-	-	37.33	-	8	-	3	-	-	-	-	-	-	-	-	-	-
Springfield, school janitor,	1	-	-	10	1	8	1	-	2	-	-	-	-	38.13	64.00	-	33.50	-	9	-	2	-	-	-	-	-	-	-	-	-	-
Springfield, civil engineering,	2	-	-	3	-	3	-	-	1	-	-	-	-	31.00	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
Springfield, civil engineering promotion.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taunton, clerical,	1	-	-	1	-	1	1	-	1	-	-	1	-	22.00	-	27.00	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Taunton, civil engineering,	2	-	-	2	-	-	1	-	-	-	-	-	-	18.00	-	-	20.00	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Waltham, foreman and inspection,	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waltham, sub-foreman,	1	-	-	1	-	-	1	-	-	1	-	-	-	37.00	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Woburn, clerical promotion,	-	-	1	1	-	-	1	-	-	1	-	-	-	31.00	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Worcester, clerical,	1	-	-	6	-	21	2	-	18	1	-	1	-	29.50	-	22.00	30.50	-	25.67	20	-	-	-	-	-	-	-	-	-	-	-
Worcester, foreman and inspection.	1	-	-	16	-	-	14	-	-	5	-	-	-	45.14	-	-	44.00	-	-	14	-	-	-	-	-	-	-	-	-	-	-
Worcester, civil engineering,	2	-	-	5	-	-	5	-	-	-	-	-	-	28.40	-	-	-	-	-	4	1	-	-	-	-	-	-	-	-	-	-
	84	1	14	435	8	179	280	6	144	111	6	44	8	33.69	64.00	23.23	33.86	31.00	24.09	410	90	186	6	1	1	-	-	-	-	-	-
	99			622			430			161			8	39.61			39.65			430			192								

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Police Service, Cities Other than Boston.

	Number of Examinations.			Number Examined.			Number Passed.			Number of Persons Appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	(General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
Beverly,	1			2			2			4				33.50						2			
Brockton,		1		11			6			2				27.00			30.40			6		5	
Brockton, promotion,			1	1			1			2				31.00						1			
Brookline,	1			17			13			3				26.31			29.75			13		4	
Brookline, promotion,			2	2			2			3				45.00						2			
Cambridge,	1			41			26			4				28.77			27.33			26		15	
Cambridge, promotion,			1	1			1			2				38.00						1			
Chelsea,	1			14			8			3				26.75			29.50			8		6	
Chicopee,	1			7			5			2				29.60			31.50			5		2	
Everett,	1			2			2			4				37.00						2			
Fall River,	1			33			28			5				28.93			34.00			28		5	
Fall River, promotion,			1	1			1			1				45.00						1			
Fitchburg,	1			3			3							33.00						3			

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Police Service, Cities Other than Boston —*Concluded.*

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons Added to the Eligible Lists.			Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	(General Competitive.	Special Competitive.	Non-competitive.	Male (Civilians.	Veterans.	Females.	Male (Civilians.	Veterans.	Females.	Male (Civilians.	Veterans.	Females.	Male (Civilians.	Veterans.	Females.	Male (Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
Salem, promotion,	-	-	1	1	-	-	1	-	-	1	-	-	43.00	-	-	-	-	-	1	-	-	-
Somerville,	-	1	-	20	-	-	17	-	-	7	-	-	30.88	-	-	33.33	-	-	17	3	-	3
Springfield,	-	1	-	19	-	-	12	-	-	9	-	-	29.25	-	-	31.14	-	-	12	-	7	-
Taunton,	1	-	-	13	-	-	11	-	-	10	-	-	30.36	-	-	34.00	-	-	11	-	2	-
Taunton, promotion,	-	-	1	1	-	-	1	-	-	3	-	-	39.00	-	-	-	-	-	1	-	-	-
Waltham,	1	-	-	9	-	-	7	-	-	2	-	-	33.14	-	-	32.00	-	-	7	-	2	-
Woburn,	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Worcester,	1	-	-	32	1	-	25	-	-	2	-	-	28.40	-	-	31.00	-	-	25	-	7	-
	35	-	14	413	1	-	365	1	-	154	-	1	34.10	58.00	-	29.46	-	-	306	-	108	-
	49			414			366			155		3	46.05			29.46			306		108	

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Summary.

	Number of Examinations.			Number Examined.			Number Passed.			Number of Persons Examined Appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.		Education of Those Failed.	
	(General Competitive.	Special Competitive.	Non-competitive.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.		Male Civilians.	Veterans.	Females.	Male Civilians.	Veterans.	Females.	Common School.	College.	Common School.	College.
State clerical service,	2	–	1	229	3	3578	97	–	2220	9	–	986	5	29.00	–	25.50	25.65	60.00	25.31	257	60	289	24
State clerical promotion,	–	–	2	1	–	1	1	–	1	1	–	1	–	25.00	–	39.00	–	–	–	2	–	–	–
Boston clerical service,	2	–	1	91	–	70	36	–	31	14	1	–	1	26.81	–	24.30	29.02	–	25.13	64	3	86	8
Boston clerical promotion,	–	–	1	1	–	–	1	–	–	4	–	–	–	21.00	–	–	–	–	–	1	–	–	–
Other cities, clerical service,	24	–	–	109	–	135	51	–	132	11	–	40	2	27.41	–	25.36	–	–	25.03	168	15	79	2
Other cities, clerical promotion,	–	–	1	1	–	–	1	–	–	1	–	–	–	31.00	–	–	–	–	–	1	–	–	–
State stenographer-typewriter service.	2	–	–	12	–	116	9	–	82	–	–	25	–	27.78	–	24.56	19.67	–	21.59	90	1	36	1
Boston stenographer-typewriter service.	2	–	–	7	–	35	5	–	18	2	–	2	–	25.40	–	27.00	37.50	–	21.65	20	3	19	–
Other cities, stenographer-typewriter service.	3	–	1	1	–	23	1	–	12	–	–	4	–	18.00	–	22.53	–	–	20.97	13	–	11	–
State prison service,	1	–	–	39	1	–	32	–	–	3	–	–	–	34.28	–	–	38.29	57.00	–	32	–	6	–
Boston prison service,	–	–	–	14	–	–	11	–	–	8	–	–	–	37.82	–	–	33.67	–	–	11	–	3	–
Other cities, prison service,	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Metropolitan park police service,	1	–	–	57	1	–	32	1	–	11	1	–	–	29.72	30.00	–	32.68	–	–	33	–	24	1

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SUMMARY — *Concluded.*

	Number of Examinations.			Number Examined.			Number Passed.			Number of Examined Persons Appointed from the Eligible Lists.			Number of Unexamined Veterans appointed.	Average Age of Those Passed.			Average Age of Those Failed.			Education of Those Passed.			Education of Those Failed.		
	General (Competitive).	Special (Competitive).	Non-competitive.	Male (Civilians).	Veterans.	Females.	Male (Civilians).	Veterans.	Females.	Male (Civilians).	Veterans.	Females.		Male (Civilians).	Veterans.	Females.	Male (Civilians).	Veterans.	Females.	Common School.	College.		Common School.	College.	
Metropolitan park police promotion,	–	–	1	–	–	–	–	–	–	–	–	–	–	38.00	–	–	–	–	–	–	–		–	–	
District police service,	–	–	–	–	–	–	–	–	–	2	–	–	3	–	–	–	–	–	–	–	–		–	–	
Boston fire service,	2	–	–	223	–	–	143	–	–	42	–	–	1	25.66	–	–	24.80	–	–	143	–		80	–	
Boston fire promotion,	–	–	10	10	–	–	10	–	–	17	–	–	–	37.90	–	–	–	–	–	10	–		–	–	
Other cities, fire service,	5	–	–	57	–	–	38	–	–	16	–	–	–	28.15	–	–	28.55	–	–	38	–		19	–	
Other cities, fire promotion,	–	1	4	24	2	1	24	1	–	10	1	–	–	38.34	62.00	–	36.00	59.00	–	25	–		2	–	
Boston police service,	2	–	–	238	–	–	142	–	–	62	–	–	–	28.69	–	–	28.55	–	–	141	1		95	1	
Boston police promotion,	–	–	19	19	–	–	18	–	–	18	–	–	–	38.50	–	–	39.00	–	–	18	–		1	–	
Other cities, police service,	35	–	1	400	1	–	262	1	–	125	1	–	1	30.00	58.00	–	29.46	–	–	263	–		108	–	
Other cities, police promotion,	–	–	13	13	–	–	13	–	–	19	–	–	2	46.05	–	–	–	–	–	13	–		–	–	
Boston drawtender service,	1	–	–	24	–	–	20	–	–	7	1	–	–	31.70	–	–	32.50	–	–	20	–		4	–	
Boston drawtender promotion,	–	–	1	1	–	–	1	–	–	1	–	–	–	45.00	–	–	–	–	–	1	–		–	–	
Other cities, drawtender service,	1	–	–	6	–	–	6	–	–	7	–	–	–	30.83	–	–	–	–	–	6	–		–	–	

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State foreman and inspection service.	2	–	–	18	–	–	11	–	–	2	–	–	–	37.82	–	–	35.86	–	–	9	2	7	–
Boston foreman and inspection service.	2	–	–	83	–	–	69	–	–	23	–	–	–	33.87	–	–	35.64	–	–	66	3	13	1
Boston foreman and inspection promotion.	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–
Other cities, foreman and inspection service.	26	–	1	137	3	–	104	3	–	38	3	–	3	37.80	61.00	–	42.31	–	–	105	2	29	4
Other cities, foreman and inspection promotion.	–	–	1	1	–	–	1	–	–	1	–	–	–	38.00	–	–	–	–	–	1	–	–	–
State sub-foreman service, .	2	–	–	4	–	–	3	–	–	–	–	–	–	29.00	–	–	47.00	–	–	2	1	1	–
Boston sub-foreman service, .	2	–	–	26	–	–	21	–	–	6	–	–	–	35.86	–	–	43.60	–	–	20	1	5	–
Other cities, sub-foreman service,	2	–	–	8	–	–	3	–	–	5	2	–	–	46.25	–	–	36.60	–	–	3	–	5	–
Other cities and towns, plumbing inspection service.	–	–	6	6	–	–	4	–	–	4	–	–	–	33.00	–	–	38.00	–	–	4	–	2	–
Boston school janitor service, .	1	–	–	70	2	3	42	–	1	15	–	–	1	33.67	–	37.00	37.18	58.00	34.00	43	–	32	–
Other cities, school janitor service,	6	–	–	44	1	–	23	1	–	8	–	–	–	38.15	64.00	–	40.36	–	–	24	–	21	–
Boston schoolhouse custodian service.	1	–	–	2	–	–	2	–	–	1	–	–	–	31.50	–	–	–	–	–	2	–	–	–
Boston superintendent service, .	–	–	1	1	–	–	1	–	–	1	–	–	–	51.00	–	–	–	–	–	1	–	–	–
Other cities, superintendent service.	2	–	–	11	2	–	8	1	–	2	–	–	2	44.57	63.00	–	43.56	63.00	–	9	–	4	–
State civil engineering service, .	2	–	–	144	–	–	112	–	–	25	–	–	–	24.16	–	–	22.41	–	–	27	85	26	6
State civil engineering promotion,	–	–	–	–	–	–	–	–	–	10	–	–	–	–	–	–	–	–	–	–	–	–	–
Boston civil engineering service, .	2	–	–	49	–	–	37	–	–	7	–	–	–	22.07	–	–	22.43	–	–	11	16	16	6
Boston civil engineering promotion.	–	–	–	–	–	–	–	–	–	12	–	–	–	–	–	–	–	–	–	–	–	–	–
Other cities, civil engineering service.	15	–	–	30	–	–	16	–	–	4	–	–	–	28.68	–	–	22.69	–	–	13	3	14	–
Other cities, civil engineering promotion.	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–
	149	1	65	2,212	16	782	1,432	8	407	571	10	168	22	32.92	56.33	27.92	32.79	59.40	24.63	1,741	190	1,019	64
			215			3,010			1,887			749	22		39.06			38.91			1,937		1,073	

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Non-competitive Examinations.

During the year there were six persons subjected to non-competitive examination for original appointment. In 2 of these cases there were no persons upon the eligible list possessing the special qualifications required, and in the 4 remaining cases there were no eligible lists.

There were 53 examinations of applicants for promotion, where the rules provide for non-competitive examination. There were also 6 persons examined for the position of plumbing inspector, in accordance with the law establishing this position.

Respectfully submitted,

WARREN P. DUDLEY,
Secretary.
HENRY SHERWIN,
Chief Examiner.

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LABOR SERVICE IN BOSTON.

During the year ending Sept. 30, 1905, 125 requisitions for laborers and mechanics were received from the several departments of the city of Boston. Of these requisitions, 37 were subsequently cancelled, upon which had been certified 93 names, 19 being those of veterans, 74 being those of others who were not veterans.

Whole number of applications received,		2,451
Number of names restored from previous years,	1,686	
Applicants registered during the year,	765	
Whole number of persons registered,		2,451
Number registered with credit as veterans,	64	
Number registered without credit as veterans,	2,387	
		2,451
Percentage registered having credit as veterans,		2.61
Percentage registered without credit as veterans,		97.39
Number of requisitions received,		125
Number of persons certified once,	565 =	565
Number of persons certified twice,	75 =	150
Number of persons certified three times,	9 =	27
Number of persons certified four times,	2 =	8
Whole number of persons certified,	651	
Whole number of certifications,		750

Of the whole number of certifications there were of veterans, 28, or 3.73 per cent.
Of the whole number of certifications there were of others, not veterans, 722, or 96.27 per cent.

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Number of persons employed (veterans),	6	
Number of persons employed (not veterans),	286	
		292

Percentage employed of veterans registered,	9.37
Percentage employed of others (not veterans) registered,	11.98
Percentage employed of whole number registered,	11.91
Percentage employed of veterans certified,	21.42
Percentage employed of others (not veterans) certified,	39.61
Percentage employed of whole number certified,	38.93

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Discharges.

Departments.	Lack of Work.	Resigned and Withdrew.	Bad Habits.	Incompetent and Unsatisfactory.	Died.	Failed to report and declined.	Transferred to Other Departments.	Not having been employed for Six Months.	No Cause assigned.	For Promotion.	Illegally employed.	Total discharged.
Bath,	–	–	–	–	–	–	1	–	–	–	–	1
Cemetery,	–	1	–	–	3	–	1	–	–	–	–	5
Fire,	–	2	–	–	–	–	–	–	–	2	–	4
Insane hospital,	–	1	–	–	–	–	–	–	–	–	–	1
Institutions, children's,	1	1	1	–	1	2	–	–	–	–	–	6
Institutions, pauper,	–	13	1	4	–	–	–	–	–	–	–	18
Lamp,	–	–	–	–	–	–	1	–	–	–	–	1
Park,	–	–	–	–	2	–	5	7	–	–	–	14
Police,	–	1	–	–	–	–	–	–	–	–	–	1
Public grounds,	–	–	–	–	–	–	3	–	–	–	–	3
Street,	–	2	–	–	100	2	–	5	–	11	2	122
Water,	5	2	1	2	14	–	–	–	1	11	–	36
Totals,	6	23	3	6	120	4	11	12	1	24	2	212

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Recapitulation.

Departments.	Requisitions.	Number of Men called for.	Number of Men certified.		Total Number certified.	Number of Men employed during the Year ending Sept. 30, 1905.				
						From register of 1904-1905.		Restored from Previous Rolls.	Transferred from Other Departments.	Totals.
			Veterans.	Others.		Veterans.	Others.			
Cemetery,	8	8	3	12	15	–	3	–	1	4
Fire,	8	9	7	15	22	–	8	–	–	8
Health,	7	7	1	25	26	–	5	–	–	5
Insane hospital,	2	2	–	10	10	–	1	–	–	1
Institutions, children's,	7	7	2	19	21	–	6	–	–	6
Institutions, pauper,	23	25	1	68	69	–	21	–	–	21
Park,	2	2	–	7	7	–	1	–	–	1
Police,	4	4	–	10	10	–	4	–	–	4
Public buildings,	7	10	–	26	26	–	3	–	–	3
Public grounds,	7	106	–	200	200	–	32	1	–	33
Street,	40	203	13	302	315	6	185	1	3	195
Transit,	1	1	–	2	2	–	1	–	–	1
Water,	9	18	1	26	27	–	16	4	7	27
Totals,	125	402	28	722	750	6	286	6	11	309

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The several registration clerks in the cities outside of Boston, where the civil service labor rules apply, have filed reports of the work in their respective cities, which are hereto annexed.

Respectfully submitted,

WILLIAM L. HICKS,
Registrar of Labor.

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LABOR SERVICE IN CAMBRIDGE.

To WILLIAM L. HICKS, *Registrar of Labor, Civil Service Commission, State House, Boston, Mass.*

SIR: — I herewith submit a full and complete report of the business of my office for the year ending Sept. 30, 1905.

Whole number of applications received,		1,533
Number of names restored from previous years,	483	
Applicants registered during the year,	1,050	
Whole number of persons registered,		1,533
Number registered with credit as veterans,	15	
Number registered without credit as veterans,	1,518	
		1,533
Percentage registered having credit as veterans,		.978
Percentage registered without credit as veterans,		99.022
Number of requisitions received,		58
Number of persons certified once,	1,044 =	1,044
Number of persons certified twice,	139 =	278
Number of persons certified three times,	13 =	39
Number of persons certified four times,	4 =	16
Number of persons certified five times,	1 =	5
Whole number of persons certified,	1,201	
Whole number of certifications,		1,382

Of the whole number of certifications there were of veterans, 12, or .87 per cent.
Of the whole number of certifications there were of others, not veterans, 1,370, or 99.13 per cent.

Number of persons employed (veterans),	10	
Number of persons employed (not veterans),	834	
		844

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Percentage employed of veterans registered,	66.66
Percentage employed of others (not veterans) registered,	54.94
Percentage employed of whole number registered,	55.05
Percentage employed of veterans certified,	83.33
Percentage employed of others (not veterans) certified,	60.87
Percentage employed of whole number certified,	61.07

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Discharges.

Departments.	Lack of Work.	Resigned and Withdrew.	Bad Habits.	Incompetent and Unsatisfactory.	Died.	Failed to report and declined.	Transferred to Other Departments.	Not having been employed for Six Months.	By Order of Civil Service Commission.	For Promotion.	Total discharged.
Bridge,	–	–	–	–	–	–	–	–	–	–	–
Cemetery,	1	3	1	1	2	–	–	–	–	–	8
City home,	–	9	–	–	1	–	–	–	–	–	10
Health,	–	–	–	–	–	–	–	–	–	–	–
Park,	69	–	–	–	3	–	3	3	–	–	78
Police (drivers, patrol),	–	–	–	–	–	–	–	–	–	–	–
Police (drivers, ambulance),	–	–	–	–	–	–	–	–	–	–	–
Public property (school),	5	–	–	–	–	–	–	–	–	–	5
Sewer,	2	27	–	–	1	–	–	–	–	–	30
Street,	–	8	–	1	6	–	1	13	–	–	29
Water,	71	184	4	24	2	–	–	–	–	–	285
Totals,	148	231	5	26	15	–	4	16	–	–	445

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Recapitulation.

Departments.	Requisitions.	Number of Men called for.	Number of Men certified.		Total Number certified.	Number of Men employed during the year ending Sept. 30, 1905.				
						From register of 1904-1905.		Restored from Previous Rolls.	Transferred from Other Departments.	Totals.
			Veterans.	Others.		Veterans.	Others.			
Bridge,	3	6	–	12	12	–	4	–	–	4
Cemetery,	3	19	1	36	37	1	10	–	1	12
City home,	4	9	–	22	22	–	8	–	–	8
Health,	–	–	–	–	–	–	–	–	–	–
Park,	15	193	3	375	378	2	191	–	1	194
Police (drivers, patrol),	–	–	–	–	–	–	–	–	–	–
Police (drivers, ambulance),	–	–	–	–	–	–	–	–	–	–
Public property (school),	2	5	–	10	10	–	4	–	–	4
Sewer,	3	27	–	54	54	–	24	–	–	24
Street,	–	–	–	–	–	–	–	–	–	–
Water,	28	444	8	861	869	7	593	–	2	602
Totals,	58	703	12	1,370	1,382	10	834	–	4	848

Respectfully,

HARRY L. LINCOLN,
Registration Clerk.

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LABOR SERVICE IN NEW BEDFORD.

To WILLIAM L. HICKS, *Registrar of Labor, Civil Service Commission, State House, Boston, Mass.*

SIR: — I herewith submit a full and complete report of the business of my office for the year ending Sept. 30, 1905.

Whole number of applications received,		204
Number of names restored from previous years,	32	
Applicants registered during the year,	172	
Whole number of persons registered,		204
Number registered with credit as veterans,	3	
Number registered without credit as veterans,	201	
		204
Percentage registered having credit as veterans,		1.47
Percentage registered without credit as veterans,		98.53
Number of requisitions received,		24
Number of persons certified once,	63 =	63
Number of persons certified twice,	4 =	8
Whole number of persons certified,	67	
Whole number of certifications,		71
Of the whole number of certifications there were of veterans,	1, or 1.41 per cent.	
Of the whole number of certifications there were of others, not veterans,	70, or 98.59 per cent.	
Number of persons employed (veterans),	1	
Number of persons employed (not veterans),	35	
		36
Percentage employed of veterans registered,		33.33
Percentage employed of others (not veterans) registered,		17.41
Percentage employed of whole number registered,		17.65
Percentage employed of veterans certified,		100.00
Percentage employed of others (not veterans) certified,		50.00
Percentage employed of whole number certified,		50.70

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Discharges.

Departments.	Lack of Work.	Resigned and Withdrew.	Bad Habits.	Incompetent and Unsatisfactory.	Died.	Failed to report and declined.	Transferred to Other Departments.	Not having been employed for Six Months.	By Order of Civil Service Commission.	For Promotion.	Total discharged.
Street, ...	–	–	1	–	6	–	1	114	–	–	122
Cemetery, ...	–	6	–	–	2	–	–	–	–	–	8
Water, ...	–	–	–	–	–	–	–	–	–	–	–
Poor, ...	–	–	–	–	1	–	–	–	–	–	1
Park, ...	4	1	–	–	1	–	2	–	–	–	8
Totals, ...	4	7	1	–	10	–	3	114	–	–	139

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Recapitulation.

Departments.	Requisitions.	Number of Men called for.	Number of Men certified.		Total Number certified.	Number of Men employed during the Year ending Sept. 30, 1905.				
						From Register of 1904-1905.		Restored from Previous Rolls.	Transferred from Other Departments.	Totals.
			Veterans.	Others.		Veterans.	Others.			
Street,	17	21	1	47	48	1	23	–	2	26
Cemetery,	3	5	–	10	10	–	5	–	–	5
Water,	–	–	–	–	–	–	–	–	–	–
Poor,	–	–	–	–	–	–	–	–	–	–
Park,	4	7	–	13	13	–	7	–	1	8
Totals,	24	33	1	70	71	1	35	–	3	39

Respectfully,

GEORGE P. BROCK,
Registration Clerk.

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LABOR SERVICE IN WORCESTER, MASS.

To WILLIAM L. HICKS, *Registrar of Labor, Civil Service Commission, State House, Boston, Mass.*

SIR: — I herewith submit a full and complete report of the business of my office for the year ending Sept. 30, 1905.

Whole number of applications received,		837
Number of names restored from previous years,	453	
Applicants registered during the year,	384	
Whole number of persons registered,		837
Number registered with credit as veterans,	34	
Number registered without credit as veterans,	803	
		837
Percentage registered having credit as veterans,		4.06
Percentage registered without credit as veterans,		95.94
Number of requisitions received,		33
Number of persons certified once,	583 =	583
Number of persons certified twice,	25 =	50
Number of persons certified three times,	1 =	3
Whole number of persons certified,	609	
Whole number of certifications,		636
Of the whole number of certifications there were of veterans,	8, or 1.26 per cent.	
Of the whole number of certifications there were of others, not veterans,	628, or 98.74 per cent.	
Number of persons employed (veterans),	6	
Number of persons employed (not veterans),	505	
		511
Percentage employed of veterans registered,		17.65
Percentage employed of others (not veterans) registered,		62.89
Percentage employed of the whole number registered,		61.05
Percentage employed of veterans certified,		75.00
Percentage employed of others (not veterans) certified,		80.41
Percentage employed of whole number certified,		80.35

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Discharges.

Departments.	Lack of Work.	Resigned and Withdrew.	Bad Habits.	Incompetent and Unsatisfactory.	Died.	Failed to report and declined.	Transferred to Other Departments.	Not having been employed for Six Months.	By Order of Civil Service Commission.	For Promotion.	Total discharged.
Buildings,	2	–	–	–	–	–	–	–	–	–	2
City messenger,	1	–	–	–	–	–	–	–	–	–	1
Parks,	4	1	–	–	–	–	–	–	–	–	5
Sewer,	13	42	3	8	–	34	1	157	–	–	258
Poor,	–	–	–	–	–	–	–	–	–	–	–
Street,	–	19	–	4	3	–	–	–	–	–	26
Water,	–	25	–	–	1	3	–	137	–	–	166
Totals,	20	87	3	12	4	37	1	294	–	–	458

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Recapitulation.

Departments.	Requisitions.	Number of Men called for.	Number of Men certified.		Total Number certified.	Number of Men employed during the Year ending Sept. 30, 1905.				
						From register of 1904-1905.		Restored from Previous Rolls.	Transferred from Other Departments.	Totals.
			Veterans.	Others.		Veterans.	Others.			
Sewer,	6	71	2	139	141	4	72	–	–	76
Street,	2	19	2	31	33	–	–	–	–	–
Park,	2	13	–	14	14	–	–	–	–	–
Totals,	10	103	4	184	188	4	72	–	–	76

Respectfully,

JOSEPH H. GLEASON,
Registration Clerk.

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Commonwealth of Massachusetts.

[Revised Laws, Chapter 19.]

OF THE CIVIL SERVICE.

CIVIL SERVICE COMMISSION AND OFFICERS.

Civil service commission. 1884, 320, § 1. 138 Mass. 603.

Section 1. The governor shall annually, in May or June, with the advice and consent of the council, appoint a civil service commissioner for a term of three years from the first Monday of July following. All appointments shall be so made that not more than two commissioners shall at the time of any appointment be members of the same political party. Each commissioner shall be paid five dollars for each day's service and his travelling and other expenses incurred in the performance of his official duties.

Chief examiner, secretary, etc. 1884, 320, § 20. 1888, 41. 1889, 177, 351. 1895, 376. [1 Op. A. G. 382.]

Section 2. The commissioners may appoint a chief examiner, who, under their direction, shall superintend any examination held under the provisions of this chapter and perform such other duties as they may prescribe. He shall receive an annual salary of three thousand dollars, and travelling expenses incurred in the performance of his official duties. They may appoint a secretary who shall receive an annual salary of two thousand dollars. They may appoint a registrar of labor, who shall, under their direction, supervise the administration of civil service rules applicable to the public labor service of the commonwealth or of any city thereof. He shall receive an annual salary of two thousand dollars, and his travelling expenses. They may incur other expenses not exceeding the annual appropriation therefor.

Witnesses and testimony. 1891, 140.

Section 3. The commissioners or any of them, in an investigation by them, may summon witnesses, administer oaths and

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take testimony. The fees of such witnesses shall be the same as for witnesses before the superior court, and shall be paid from the appropriation for the incidental expenses of the commissioners.

See also R. L. 175, § 10.

SECTION 4. They may designate persons in the official service of the commonwealth or of any city or of any town wherein this chapter is in force, who shall, with the consent of the head of department or office in which any such person serves, act as examiners of applicants for public employment. But no person shall serve as such examiner when any relative or connection by marriage, within the degree of first cousin, shall be an applicant.

Examiners. 1884, 320, § 20.

SECTION 5. They shall keep records of their proceedings and of examinations made by them or under their authority. Recommendations of applicants received by them or by any officer authorized to make appointments or to employ laborers or others, within the scope of such rules, shall be preserved. Such records and recommendations shall, under regulations approved by the governor and council, be open to public inspection. The commissioners shall from time to time suggest to the general court appropriate legislation for the administration and improvement of the civil service and shall annually before the tenth day of January make a report which shall contain any rules adopted under the provisions of this chapter.

Records and annual report. 1884, 320, §§ 2, 23. Amended by c. 308, Acts of 1902.

RULES.

SECTION 6. The commissioners shall from time to time prepare rules regulating the selection of persons to fill appointive positions in the government of the commonwealth and of the several cities thereof and the selection of persons to be employed as laborers or otherwise in the service of the commonwealth and said several cities, and altering, rescinding, amending or adding to the rules now established. Such rules may be of general or limited application and shall take effect only when approved by the governor and council.

Rules. 1884, 320, § 2. 138 Mass. 601. 143 Mass. 589. 145 Mass. 587, 589.

SECTION 7. The rules heretofore prepared by the commissioners and now in force shall continue in force, and such rules, and those hereafter prepared by them and approved by the governor and council shall be administered by the commissioners.

Application of rules. 1884, 320, § 14. 1895, 501, § 1. 1896, 517, § 8. 138 Mass. 603. 145 Mass. 590. 178 Mass. 186.

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They shall not be inconsistent with law, may be of general or limited application and shall include provisions for: —

The classification of the positions and employments to be filled.

Open competitive and other examinations to test the practical fitness of applicants.

The filling of vacancies in and the selection of persons for public positions and employments in accordance with the results of such examinations, or in the order of application, or otherwise.

Promotions, if practicable, on the basis of ascertained merit in the examination and seniority of service.

A period of probation before an appointment or employment is made permanent.

Preference to veterans in appointment and promotion.

Printing and distribution of rules.
1884, 320, § 19.
1888, 253.

SECTION 8. Changes in the rules shall forthwith, when approved, be printed for distribution, and a certified copy thereof sent to the mayor of each city and the selectmen of each town to which such changes relate, and shall be published in one or more newspapers. In such publication the date when such changes shall take effect shall be specified, which date shall be not less than sixty days subsequent to the date of such publication.

Officers not affected.
1884, 320, § 15.
1893, 95.
1896, 502.
[1 Op. A. G. 72, 194.]
178 Mass. 186.

SECTION 9. Judicial officers and officers elected by the people or by a city council, or whose appointment is subject to confirmation by the executive council or city council of any city, officers elected by either branch of the general court and the appointees of such officers, heads of principal departments of the commonwealth or of a city, the employees of the treasurer and receiver general, of the board of commissioners of savings banks, and of the treasurer and collector of taxes of any city, two employees of the city clerk of any city, teachers of the public schools, the secretaries and confidential stenographers of the governor, or of the mayor of any city, police and fire commissioners and chief marshals or chiefs of police and fire departments, shall not be affected as to their selection or appointment by any rules made as aforesaid; but, with the above exception, such rules shall apply to members of police and fire departments.

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SPECIAL PROVISIONS APPLICABLE TO BOSTON.

Classification of janitors, etc., in charge of steam boilers in school houses in Boston. 1889, 352. 1893, 253.

SECTION 10. Engineers, janitors and all persons having charge of steam boilers and furnaces in the school buildings in the city of Boston, and truant officers appointed by the school committee of said city, shall be classified and appointed pursuant to this chapter and the rules thereunder.

Qualifications of firemen in Boston. Placing on list for permanent appointment. 1896, 256, 424.

SECTION 11. Persons five feet five inches in height or over, if otherwise qualified, shall be eligible to appointment in the fire department of the city of Boston. Call members in said department who have served three or more successive years shall, upon application to the civil service commissioners, be placed upon the eligible list for appointment as permanent men without further examination, and may at the discretion of the fire commissioner be appointed at the same salary as permanent men who have served three or more years in said service.

APPLICATIONS.

Statements of applicants for examination. 1884, 320, § 17. 1889, 183. 145 Mass. 587, 589.

SECTION 12. Every application shall state under oath the full name, residence and post office address, citizenship, age, place of birth, health and physical capacity, right of preference as a veteran, previous employment in the public service, business or employment and residence for the previous five years, and education of the applicant, and such other information as may reasonably be required relative to his fitness for the public service.

Application for registry in labor service. 1897, 328.

Applicants for positions in the labor service of the commonwealth or of the cities thereof shall, to the number of five hundred, be allowed to register on the first Monday of February, May, August and November in each year, at the places appointed therefor.

EXAMINATIONS AND LISTS.

Scope of examination. 1884, 320, § 16.

SECTION 13. No question in any examination shall relate to, and no appointment to a position or selection for employment shall be affected by, political or religious opinions or affiliations. Examinations shall be practical and shall relate to matters which will fairly test the capacity and fitness of the applicants. The examination of applicants for employment as

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laborers shall relate to their capacity for labor and habits of sobriety and industry and to the necessities of themselves and their families.

Obstruction of right of examination forbidden. 1884, 320, § 80.

SECTION 14. No person in the public service shall wilfully and corruptly defeat, deceive or obstruct any person as to his right of examination; or wilfully or corruptly make a false mark, grade, estimate or report upon the examination or proper standing of any person examined hereunder, or aid in so doing; or wilfully or corruptly make any false representation concerning the same or concerning the person examined; or wilfully or corruptly furnish to a person special or secret information, for the purpose of improving or injuring the prospects or chances of appointment, employment or promotion of any person so examined or to be examined.

Lists of names of successful applicants. 1895, 501, § 4. 1896, 517, § 4.

SECTION 15. The commissioners, within five days after the results of an examination have been ascertained, shall prepare a list of the applicants who have passed the examination, with the standing of each; and, within five days after certification of persons for appointment or employment, prepare a list of the persons so certified which shall be open to public inspection.

APPOINTMENTS.

Vendor or user of liquor ineligible. 1884, 320, § 3.

SECTION 16. No person habitually using intoxicating liquors to excess and no vendor of intoxicating liquors shall be appointed to or retained in any office, appointment or employment to which the provisions of this chapter apply.

Convicts ineligible for one year. 1884, 320, § 4. 1888, 334. [1 Op. A. G. 243.]

SECTION 17. No person shall be appointed to or employed in any office to which the provisions of this chapter apply within one year after his conviction of any crime against the laws of this commonwealth.

Recommendations of public officers restricted. 1884, 320, § 5.

SECTION 18. No recommendation of an applicant for a position or employment under the provisions of this chapter given by any member of the general court, alderman or councilman, except as to the character or residence of the applicant, shall be received or considered by any person concerned in making the appointment under this chapter.

Name, etc., of appointees to be reported to commissioners. 1884, 320, § 22.

SECTION 19. The name and residence of every person, except laborers, appointed to, promoted or employed in a position coming within the rules governing the civil service, the designa-

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tion of such position and the rejection or discharge of every such person, shall forthwith be reported to the commissioners by the officer making such appointment, promotion, rejection or discharge, or providing such employment.

VETERANS' PREFERENCE.

SECTION 20. The word "veteran" in this chapter shall mean a person who has served in the army or navy of the United States in the war of the rebellion and was honorably discharged therefrom, or a citizen of this commonwealth who distinguished himself by gallant and heroic conduct while serving in the army or navy of the United States and has received a medal of honor from the president of the United States.

Definition of "veteran." 1896, 517, §§ 1, 6.

SECTION 21. A veteran may apply for examination under the rules, and if he passes the examination, shall be preferred in appointment and employment to all persons not veterans. The commissioners shall cause the names of the veterans who pass the examination to be placed upon the eligible list in the order of their respective standing, above the names of all other applicants, and to be certified to the appointing officers for appointment and employment in preference to other applicants, and the appointment or employment shall be made from the list so certified, but this section shall not apply to the detective department of the district police. Nothing herein shall prevent the certification and employment of women.

Application of veterans for examination. 1887, 437. 1889, 473. 1895, 501, §§ 1-3, 6. 1896, 517, § 2. 145 Mass. 587. 166 Mass. 14, 589. [1 Op. A. G. 243, 340.] As amended by c. 413, Acts of 1902.

SECTION 22. A veteran may apply for appointment to or for employment in the classified public service without examination. In such application, he shall state under oath the facts required by the rules. Age, loss of limb or other disability which does not in fact incapacitate shall not disqualify him for appointment or employment under the provisions of this section. Appointing officers may make requisition for the names of any or all such veterans and appoint or employ any of them.

Application for employment. 1896, 517, § 3. 166 Mass. 589.

SECTION 23. No veteran who holds an office or employment in the public service of the commonwealth, or of any city or town therein, shall be removed or suspended, or shall, without his consent, be transferred from such office or employment, nor shall his office be abolished, nor shall he be lowered in rank or compensation, except after a full hearing of which he shall have at least seventy-two hours' written notice, with a statement of the reasons for the contemplated removal,

Removal of veteran only after hearing. 1894, 519. 1896, 517, § 6. 1901, 339. 175 Mass. 489. 179 Mass. 409. As amended by c. 150, Acts of 1905.

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suspension, transfer, lowering in rank or compensation, or abolition. The hearing shall be before the state board of conciliation and arbitration, if the veteran is a state employee, or before the mayor of the city or selectmen of the town of which he is an employee, and the veteran shall have the right to be present and to be represented by counsel. Such removal, suspension or transfer, lowering in rank or compensation, or such abolition of an office, shall be made only upon a written order stating fully and specifically the cause or causes therefor, and signed by said board, mayor or selectmen, after a hearing as aforesaid.

Rules for veterans. 1896, 517, § 6. 166 Mass. 589. 170 Mass. 58.

SECTION 24. The rules shall provide for the employment of veterans in the labor service of the commonwealth and of the cities and towns thereof, in the class for which they make application, in preference to all other persons except women. If the appointing officer certifies in his requisition for laborers that the work to be performed requires young and vigorous men, and, upon investigation, the commissioners are satisfied that such certificate is true, they may fix a limit of age and certify only those whose age falls within such limit. In cities and towns in which the provisions of this chapter and the rules governing the civil service have not been applied to the labor service, the selectmen and the city councils shall take any necessary action to secure the employment of veterans in the labor service of their respective cities and towns in preference to all other persons except women.

Reinstatement of certain persons. 1898, 454.

SECTION 25. Any person in the classified public service of the commonwealth or of any city or town thereof who resigns such office or leaves such service for the purpose of enlisting and serving in the army or navy of the United States or in the militia of this commonwealth in time of war and so enlists and serves, may at any time within one year after his honorable discharge from such military or naval service be appointed to or employed in his former or a similar position or employment, without application or examination.

CORRUPT PRACTICES.

Public officers not to solicit contributions for political purposes. 1884, 320, § 6.

SECTION 26. No councillor, member of the general court, alderman or councilman, or any officer or employee of any of said bodies, and no executive or judicial officer of the common-

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wealth, no clerk or employee of any department or branch of the government of the commonwealth and no executive officer, clerk or employee of any department of a city shall personally solicit or receive, directly or indirectly, or be concerned in soliciting or receiving, any assessment, subscription or contribution for any political purpose whatever; but this shall not forbid such persons to be members of political organizations or committees.

Solicitations forbidden in official buildings. 1884, 320, § 7.

SECTION 27. No person shall solicit in any manner whatever or receive any contribution of money or other thing of value for any political purpose whatever in a room or building occupied for the performance of official duties by an officer or employee of the commonwealth or of any city herein.

Public officers, etc., not to be affected by refusal to contribute. 1884, 320, § 8. 142 Mass. 90, 95.

SECTION 28. No officer or employee of the commonwealth or of any city or town wherein this chapter is in force, shall discharge, promote, or degrade an officer or employee, or change his official rank or compensation, or promise or threaten so to do, for giving, withholding or neglecting to make a contribution of money or other valuable thing for a political purpose.

Gifts for political object forbidden. 1884, 320, § 9.

SECTION 29. No officer, clerk or other person in the service of the commonwealth or of any city or town wherein this chapter is in force shall, directly or indirectly, give or deliver to an officer, clerk or person in said service, or to any councillor, member of the general court, alderman, councilman or commissioner, any money or other valuable thing on account of, or to be applied to, the promotion of any political object whatever.

Coercion of political action forbidden. 1884, 320, § 10.

SECTION 30. No person in the service of the commonwealth or of any city or town wherein this chapter is in force shall use his official authority or influence to coerce the political action of any person or body, or to interfere with any election.

Public officers, etc., not required to contribute to political fund. 1884, 320, § 11. 142 Mass. 90, 95.

SECTION 31. No person in the public service shall, for that reason, be under obligation to contribute to any political fund, or to render any political service, and shall not be removed or otherwise prejudiced for refusing to do so.

Corrupt methods of procuring nominations, etc., prohibited. 1884, 320, § 12.

SECTION 32. No person holding a public office or in nomination for, or seeking a nomination for, or appointment to, an office, shall corruptly use or promise to use, directly or indirectly, any official authority or influence to confer upon any person, or to aid a person to obtain, an office or public employment, or a nomination, confirmation, promotion or increase of

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salary, upon the consideration or condition that the vote, political influence or action of any person shall be given or used in behalf of a candidate, officer or party, or upon any other corrupt condition or consideration.

Refreshments at public expense regulated. 1884, 320, § 13.

SECTION 33. No city shall pay a bill incurred by any official thereof for wines, liquors or cigars; nor shall a city pay a bill for refreshments furnished to an official of said city if the amount for any one day exceeds one dollar for each member of the government of said city who certifies over his own signature to the correctness of the bill.

GENERAL PROVISIONS.

Enforcement of rules. 1901, 512.

SECTION 34. If, in the opinion of the civil service commissioners, a person is appointed or employed in the public service classified under civil service rules in violation of any such rules, the commissioners shall, after written notice mailed to the appointing or employing officer or officers and to such person, notify in writing the treasurer, auditor or other disbursing officer of the commonwealth, city or town in whose service such person is so employed, and the payment of any compensation to such person shall be illegal and shall cease at the expiration of one week after the mailing of the latter notice, until the legality of such appointment or employment is duly established. The attorney general may, within thirty days after said notice to such treasurer, auditor or other disbursing officer, file in the superior court, sitting in equity for the county in which such appointee or employee was appointed or employed, an information in the nature of a quo warranto against such appointee or employee, and the superior court or any justice thereof shall have jurisdiction to hear and determine the same. At any time after the beginning of such proceedings the court may, if it is of opinion that there is reasonable doubt whether the employment of such person is in violation of such rules, order that the compensation accruing to the person notified shall be paid to him until otherwise ordered by said court. If the attorney general shall fail within said thirty days to file such information, the said notice shall be regarded as null and void.

Penalties. 1884, 320, § 24. 1895, 501, § 5.

SECTION 35. Whoever makes an appointment to office or selects a person for employment contrary to, or wilfully refuses

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or otherwise neglects to comply with, the provisions of this chapter or of any rule hereunder shall, unless some other penalty is specifically provided, be punished by a fine of not less than one hundred nor more than one thousand dollars for each offence. 1896, 517, § 7. 143 Mass. 589.

SECTION 36. This chapter shall be in force in any town of more than twelve thousand inhabitants when accepted by it. So much of this chapter and the rules established under it as relate to the employment of laborers, designated as the "Labor Service," shall not be in force in any city of less than one hundred thousand inhabitants until the city council, with the approval of the mayor, accepts the same. Application of chapter. 1894, 267. 1896, 449.

SECTION 37. In a town which by a vote of a majority of the voters voting thereon at an annual or special town meeting accepts the provisions of this section or has accepted the corresponding provisions of earlier laws, the provisions of this chapter and the rules made under the authority thereof which relate to the police and fire forces of cities except Boston shall apply to all members of the regular or permanent police and fire forces, or to the call fire force, or to either of said forces, of a town. Such vote may limit the application of the provisions of this chapter and of the rules made thereunder either to the police force or to the fire force of such town, or it may extend such application to both of said forces. Upon such vote of acceptance, each member of the force or forces included therein and within the classified civil service shall continue to hold his office until his death, resignation or removal. He shall not be removed except for cause shown after a full hearing before the board or officer of the town having power to make removals, and such member shall have the right to be present at such hearing and to be represented by counsel. Application to fire and police forces in towns. 1901, 78.

[REVISED LAWS, CHAPTER 24.]

SECTION 24. A city may appropriate money for the enforcement therein of the laws relating to its civil service. Appropriations for enforcement of civil service law. 1887, 345.

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[Acts of 1893, Chapter 253.]

AN ACT PLACING TRUANT OFFICERS IN THE CITY OF BOSTON UNDER CIVIL SERVICE RULES.

Be it enacted, etc., as follows:

Appointment and classification of truant officers in Boston.

SECTION 1. All truant officers hereafter appointed by the school committee of the city of Boston, as provided in section eleven of chapter forty-eight of the Public Statutes, shall be classified and appointed pursuant to the provisions of chapter three hundred and twenty of the acts of the year eighteen hundred and eighty-four and the rules of the civil service commissioners made and established thereunder.

SECTION 2. This act shall take effect upon its passage. [*Approved April 24, 1893.*

[Revised Laws, Chapter 225.]

Transfer of watchmen. 1894, 349. As amended by c. 214, Acts of 1904.

SECTION 10. An officer in a jail or house of correction may be transferred to the state prison, the Massachusetts reformatory, or the temporary industrial camp for prisoners as a watchman; and if the place in which he is employed is not in the classified list prepared by the civil service commissioners, they shall give him a non-competitive examination as to his fitness, upon receipt from the warden of the state prison, the superintendent of the Massachusetts reformatory or the superintendent of the temporary industrial camp for prisoners of a statement that the appointment of such officer is desired and that he possesses particular qualifications for the work which will be required of him.

[Revised Laws, Chapter 108.]

Reserve police force. 1896, 314, §§ 1, 4.

SECTION 26. Any city, except Boston, in which the city council, with the approval of the mayor, accepts the provisions of this and the two following sections or has accepted the corresponding provisions of earlier laws, may establish a reserve police force; and appointments thereto shall be made in the same manner as appointments to the regular police force of said city, subject to such rules as the civil service commissioners may prescribe.

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SECTION 27. The number of members of such reserve force shall not exceed five in cities in which the number of members of the regular force does not exceed fifteen. If the number of members of the regular force exceeds fifteen, one member may be added to the reserve force for every three of the regular force above fifteen and not above thirty; one for every five of the regular force above thirty and not above eighty; and one for every ten of the regular force above eighty. Number of members. 1896, 314, § 2.

SECTION 28. The mayor, chief of police or city marshal of a city in which such reserve force is established may assign the members thereof to duty in said city whenever and for such length of time as said mayor, chief of police or marshal may deem necessary; and when on duty the members of said reserve force shall have all the powers and duties of members of the regular police force of said city. The compensation of the members of said reserve force shall be fixed by the city council. Powers, duties, compensation. 1896, 314, § 3.

[ACTS OF 1897, CHAPTER 209.]

AN ACT RELATIVE TO APPOINTMENT IN THE SOMERVILLE FIRE DEPARTMENT.

Be it enacted, etc., as follows:

SECTION 1. All members of the Somerville fire department, known as call members, who were appointed before the enactment of chapter three hundred and twenty of the acts of the year eighteen hundred and eighty-four, and who have continued three or more years in said service, shall, upon application to the civil service commissioners, be placed upon the eligible list for appointment as permanent men, without any further examination. Somerville fire department.

SECTION 2. The mayor may at his discretion appoint such men on the permanent force at the same salary as a permanent man who has continued three or more years in said service.

SECTION 3. This act shall take effect upon its acceptance by the city government of the city of Somerville. [*Approved March 29, 1897. Accepted by city July 3, 1902.*

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[Acts of 1898, Chapter 173.]

AN ACT RELATIVE TO APPOINTMENTS IN THE FIRE DEPARTMENT OF THE CITY OF LOWELL.

Be it enacted, etc., as follows:

Chief engineer may appoint certain persons as members of the permanent force, etc.

SECTION 1. The chief engineer of the fire department of the city of Lowell may, on the recommendation of the board of engineers, appoint as members of the permanent force, or as call-men, without civil service examination, any person who has served as call or substitute call-man in said service for three or more successive years prior to the passage of this act.

May discharge subordinate officers, etc.

SECTION 2. Said chief engineer shall have the power to discharge all subordinate officers and employees in the fire department of said city, except the members of said board, and, with the approval of said board, to appoint and employ all such officers and employees.

Repeal.

SECTION 3. All acts and parts of acts inconsistent herewith are hereby repealed.

SECTION 4. This act shall take effect upon its passage. [*Approved March 15, 1898.*

[Revised Laws, Chapter 223.]

Age of applicants for prison service. 1899, 245, §§ 1, 4.

SECTION 3. The officers of the state prison shall be a warden, deputy-warden, chaplain, physician and surgeon, clerk, engineer, assistant engineer, electrician, steward who shall be employed in the kitchen department of the prison, four turnkeys, as many watchmen, not exceeding forty-nine, and as many assistant watchmen, not exceeding five, as the warden, subject to the approval of the prison commissioners, may find necessary. In certifying the names of persons eligible to appointment as assistant watchmen, the civil service commissioners shall certify the names of persons who are over the age of twenty-five and under the age of forty years.

[Revised Laws, Chapter 192.]

Informations. 1899, 376. 163 Mass. 446.

SECTION 12. The supreme judicial court shall have jurisdiction of informations in the nature of quo warranto filed by the attorney general against a person holding or claiming the right to hold an office or employment, the salary or compensation of which is payable by the commonwealth, a county, city or town.

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[Acts of 1900, Chapter 69.]

AN ACT TO EXTEND THE PROVISIONS OF THE CIVIL SERVICE ACT TO THE POLICE AND FIRE FORCES OF THE TOWN OF MILTON.

Be it enacted, etc., as follows:

Milton police and fire service.

SECTION 1. The provisions of chapter three hundred and twenty of the acts of the year eighteen hundred and eighty-four, entitled "An Act to improve the civil service of the Commonwealth and the cities thereof," and all acts in amendment thereof and in addition thereto, and the civil service rules thereunder which relate to the police and fire forces of cities of the Commonwealth other than the city of Boston, are hereby extended and made applicable to all members of the regular or permanent police force and to all members of the fire force of the town of Milton.

SECTION 2. All members of said regular police and fire forces shall continue to hold their several offices until resignation or removal.

As amended by c. 288, Acts of 1904.

SECTION 3. No member of either of said forces shall be removed except for cause shown after a full hearing before the board or officer of the town having power to make removals, at which hearing the member in question shall have the right to be present and to be represented by counsel.

SECTION 4. This act shall take effect upon its passage. [*Approved February 13, 1900.*

[Acts of 1900, Chapter 95.]

AN ACT TO PROVIDE FOR THE APPOINTMENT OF A RESERVE POLICE FORCE IN THE CITY OF FALL RIVER.

Be it enacted, etc., as follows:

Fall River police service.

SECTION 1. The board of police for the city of Fall River may from time to time, as authorized by said city and under such rules as the civil service commissioners of the Commonwealth prescribe, appoint suitable persons to constitute a reserve police force for said city, who shall be subject to such rules and regulations as the board of police may prescribe, and who may be removed by said board for any reason satisfactory to it. Said board of police may assign the members of said reserve police force to duty in said city whenever and for such time as it shall deem necessary, and when on duty they shall have and

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exercise all the powers and duties held and exercised by the police of said city.

SECTION 2. All appointments upon the regular police force of said city shall be made from the reserve police force, under such rules as the civil service commissioners of the Commonwealth may prescribe; and service on the reserve police force for not less than six months shall be deemed to be equivalent to the probationary period now required by the rules of said commissioners.

SECTION 3. The members of the reserve police force shall when on duty be paid by the city of Fall River such compensation, not exceeding two dollars and fifty cents a day, as the board of police may prescribe.

SECTION 4. This act shall take effect upon its passage. [*Approved February 20, 1900.*

[ACTS OF 1900, CHAPTER 133.]

AN ACT TO EXTEND THE PROVISIONS OF THE CIVIL SERVICE LAW TO THE POLICE AND FIRE FORCES OF THE TOWN OF NATICK.

Be it enacted, etc., as follows:

Natick police and fire service.

SECTION 1. The provisions of chapter three hundred and twenty of the acts of the year eighteen hundred and eighty-four, entitled "An Act to improve the civil service of the Commonwealth and the cities thereof," and of all acts in amendment thereof, and the civil service rules thereunder which relate to the police and fire forces of cities of the Commonwealth other than the city of Boston, are hereby extended and made applicable to the members of the regular police force and all members of the fire force of the town of Natick.

SECTION 2. All members of said regular police and fire forces shall continue to hold their respective offices until resignation or removal.

SECTION 3. No member of either of said forces shall be removed except for cause shown, after a full hearing before the selectmen of said town, at which hearing the member in question shall have the right to be present and to be represented by counsel.

SECTION 4. This act shall take effect upon its acceptance by a majority of the legal voters of said town present and voting thereon at an annual town meeting or at any town meeting duly

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called for the purpose. If the vote thereon is taken at an annual town meeting it shall be by official ballot in answer to the question, "Shall an act passed by the general court in the year nineteen hundred, to extend the civil service law to the police and fire forces of Natick, be accepted?" [*Approved March 8, 1900.*

[Acts of 1903, Chapter 102.]

AN ACT TO EXTEND THE PROVISIONS OF THE CIVIL SERVICE ACT TO THE TOWN OF MILTON.

Be it enacted, etc., as follows:

R. L. 19, etc., extended to Milton.

SECTION 1. The provisions of chapter nineteen of the Revised Laws entitled, "Of the Civil Service", and all acts in amendment thereof and in addition thereto, and the civil service rules established thereunder, are hereby extended and made applicable to the following named offices in the town of Milton, to wit: —

Officers affected.

Heads of principal departments not elected by the voters, chief superintendents of departments, clerks and confidential stenographers of the selectmen, and all offices in the public service classified in and included by said civil service rules in the division designated as the "official service."

Terms of officers.

SECTION 2. Every person holding an office in the town of Milton, enumerated in section one, shall continue to hold such office until resignation or removal.

As amended by c. 143, Acts of 1904.

SECTION 3. This act shall take effect upon its acceptance by a majority vote of the voters of said town present and voting thereon at a town meeting duly called for the purpose within three years after its passage; but only one such meeting shall be called. [*Approved February 25, 1903.*

[Acts of 1904, Chapter 194.]

AN ACT RELATIVE TO REGULATIONS CONCERNING THE HEIGHT AND WEIGHT OF MEMBERS OF FIRE DEPARTMENTS.

Be it enacted, etc., as follows:

Height and weight of members of fire departments.

SECTION 1. No regulations concerning the height or weight of persons who shall be eligible to become members of the fire department in any city or town shall be made or enforced except by the city council of such city, by the selectmen of

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such town, or by the board or officer having authority to make appointments in the fire department of such city or town.

SECTION 2. This act shall take effect upon its passage. [*Approved March 31, 1904.*

[ACTS OF 1904, CHAPTER 198.]

AN ACT RELATIVE TO THE CIVIL SERVICE RULES AND REGULATIONS.

Be it enacted, etc., as follows:

Certification three separate times.

SECTION 1. No rules shall be made or enforced by the civil service commissioners which shall prevent the certification for the same office, on at least three separate occasions, of any person whose name is on any register. But in case the said commissioners shall find upon investigation that any person who has once or twice so been certified is morally unfit to hold the office or position in question, he shall not be entitled to be certified again.

SECTION 2. This act shall take effect upon its passage. [*Approved March 31, 1904.*

[ACTS OF 1904, CHAPTER 314.]

AN ACT TO REGULATE REMOVALS AND SUSPENSIONS FROM OFFICE AND EMPLOYMENT IN THE CLASSIFIED CIVIL SERVICE.

Be it enacted, etc., as follows:

Removals, etc., in classified service.

SECTION 1. Every person holding office or employment in the public service of the Commonwealth or in any county, city or town thereof, classified under the civil service rules of the Commonwealth, shall hold such office or employment and shall not be removed therefrom, lowered in rank or compensation, or suspended, or, without his consent, transferred from such office or employment to any other except for just cause and for reasons specifically given in writing.

Notice to be given, etc. As amended by c. 243, Acts of 1905.

SECTION 2. The person sought to be removed, suspended, lowered or transferred shall be notified of the proposed action and shall be furnished with a copy of the reasons required to be given by section one, and shall, if he so requests in writing, be given a public hearing, and be allowed to answer the charges preferred against him either personally or by counsel. A copy of such reasons, notice and answer and of the order of

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removal, suspension or transfer shall be made a matter of public record: *provided, however*, that nothing contained in this act shall be construed to prevent temporary suspension for a period not exceeding thirty days, made without compliance with the provisions of this act and pending further action under this act. [*Approved May 9, 1904.*

[Acts of 1905, Chapter 150.]

AN ACT RELATIVE TO THE RANK AND COMPENSATION OF VETERANS EMPLOYED IN THE CIVIL SERVICE.

Be it enacted, etc., as follows:

Veterans, removal and suspension.

SECTION 1. Section twenty-three of chapter nineteen of the Revised Laws is hereby amended by inserting after the word "abolished", in the fifth line, the words: — nor shall he be lowered in rank or compensation, — by inserting after the word "transfer", in the seventh line, the words: — lowering in rank or compensation, — and by inserting after the word "transfer", in the twelfth line, the words: — lowering in rank or compensation, — so as to read as follows: — *Section 23.* No veteran who holds an office or employment in the public service of the Commonwealth, or of any city or town therein, shall be removed or suspended, or shall, without his consent, be transferred from such office or employment, nor shall his office be abolished, nor shall he be lowered in rank or compensation, except after a full hearing of which he shall have at least seventy-two hours' written notice, with a statement of the reasons for the contemplated removal, suspension, transfer, lowering in rank or compensation, or abolition. The hearing shall be before the state board of conciliation and arbitration, if the veteran is a state employee, or before the mayor of the city or selectmen of the town of which he is an employee, and the veteran shall have the right to be present and to be represented by counsel. Such removal, suspension or transfer, lowering in rank or compensation, or such abolition of an office, shall be made only upon a written order stating fully and specifically the cause or causes therefor, and signed by said board, mayor or selectmen, after a hearing as aforesaid.

SECTION 2. This act shall take effect upon its passage. [*Approved March 9, 1905.*

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CIVIL SERVICE RULES.

In accordance with the provisions of chapter 19 of the Revised Laws of Massachusetts, and acts in amendment thereof, the following rules have been prepared for the selection of persons to fill certain offices in the government of the Commonwealth and of cities and certain towns thereof, and for the selection of persons to be employed as laborers therein; and all rules heretofore prepared and approved are hereby rescinded.

RULE 1.

Term "city" or "cities" defined.

1. The term "city" or "cities," as used in these rules, shall be construed to include and apply to every city or town in the Commonwealth to which such rules shall be applicable.

Term "appointing officer" defined.

2. The term "appointing officer," in these rules, shall mean and include any and all persons and boards having the power of appointment.

Word "veteran" defined.

3. The word "veteran," in these rules, is used in the sense defined by law.*

RULE 2.

Appointments and removals, responsibility for.

1. The power to remove or reduce, within the classified service, existing by law, on the part of any officer or board, is not impaired by anything contained in these rules.

RULE 3.

Regulations for carrying out rules.

1. The commissioners will make and issue, from time to time, as the needs of the service require, such regulations as may be necessary for conducting the business of their office, for the instruction of their secretary, chief examiner, registrar of labor and local boards of examiners, and for carrying out the provisions of these rules.

* See section 20, chapter 19, Revised Laws.

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RULE 4.

Commissioners to designate boards of examiners.

1. For the purpose of making examinations of applicants, the commissioners will designate persons to be examiners, and may at any time substitute another person in place of any one so designated.

Experts to aid examiners in certain cases.

2. Whenever the special qualifications required for a position are such that assistance from experts in conducting an examination is advisable, such experts may be designated to aid the examining board; and, so far as practicable, such experts shall be persons employed in the department to which the applicant seeks admission.

RULE 5.

Commissioners to apply to local authorities for temporary quarters, etc.

1. In order that suitable provision may be made for conducting examinations in the several cities, the commissioners will, from time to time, apply to the proper authorities thereof for temporary quarters and for clerical assistance in receiving and filing applications for appointment in the local service.

CLASSIFICATION OF THE SERVICE.

RULE 6.

Classification, two divisions.

1. The offices and places to be filled under these rules shall be classified in two divisions: the first to be known as "The Official Service" of the Commonwealth and the several cities thereof; the second as "The Labor Service."

FIRST DIVISION.

RULE 7.

First division, two schedules, A and B.

1. There shall be two schedules under the first division, known as Schedule A and Schedule B.

Schedule A.

Amendments. Oct. 1, 1894, Feb. 15, 1897, and Feb. 1, 1900. 178 Mass. 186.

2. Schedule A shall include chief clerks and secretaries, paymasters, clerks, copyists, recorders, book-keepers, inspectors, agents, purchasing agents, almoners, visitors, stenograph-

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ers, typewriters, messengers, cashiers, collectors, storekeepers, stock keepers, proof readers, and persons rendering service similar, in the opinion of the commissioners, to that of any of the above-specified positions, in the service of the Commonwealth or of any city thereof, under whatever designation, whether such service is permanent or temporary, and whether the same is paid by time for work done, by the piece, or in any other manner.

There shall be the following classes in Schedule A: —

Class 1. Persons rendering service as chief clerks and secretaries, paymasters, clerks, copyists, recorders, book-keepers, cashiers, collectors, storekeepers, or any similar service, whose annual compensation is at the rate of eight hundred dollars or less, also messengers, office boys, and all persons, under whatever designation, performing messenger or similar service, at said rate of compensation; *provided, however*, that the messengers of the governor, and one messenger of the mayor of any city, are excepted herefrom.

Class 2. Persons rendering similar service to that specified in class 1, whose annual compensation is at the rate of more than eight hundred dollars.

Class 3. Agents, purchasing agents, almoners, inspectors other than inspectors of work, visitors, stock keepers, proof readers, and all persons rendering similar service, under whatever designation, whose duties may be in part clerical.

Class 4. Stenographers and typewriters.

Schedule B.

There shall be the following classes in Schedule B: —

Amendment. Feb. 1, 1900.

Class 1. Turnkeys, watchmen, drivers of prison wagons, and all other persons doing police duty in the parks, public grounds, prisons, houses of detention, reformatories and in all other public institutions, places and departments of the Commonwealth and the several cities thereof, not included in classes 3 and 4 of Schedule B; also watchmen, gatemen and guards in the public parks and ferries.

Class 2. All members of the fire department in the city of Boston, except call substitutes.

Amendments. Oct. 1, 1894, and Feb 1, 1900.

Class 3. *a*. The detective force of the district police.

b. The inspection force of the district police.

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c. Fire inspectors and all other persons, under whatever designation, employed in detective work in the fire marshal's department of the district police. Feb. 15, 1897.

d. The regular and reserve police forces of, and all persons doing permanent police duty in and for and paid by, any city (as defined in Rule 1), except Boston.

e. The special, substitute or supernumerary police forces of, and all persons doing temporary police duty in and for and paid by, any city, except Boston.

Class 4. All members of the regular and reserve police forces in the city of Boston.

Class 5. Engineers and assistant engineers, draw-tenders and assistant draw-tenders employed on bridges in the cities of the Commonwealth. Classified March 1, 1886. Amended Feb. 1, 1888, Oct. 1, 1894, and Feb. 1, 1900.

Class 6. Foremen of laborers, inspectors of work, and all persons, under whatever designation, doing similar work in the service of the Commonwealth or any city thereof, and not included in Schedule A.

Class 7. Sub-foremen of laborers, and all persons, under whatever designation, doing similar work in the service of the Commonwealth or any city thereof.

Class 8. Janitors, engineers and persons having charge of school or other public buildings, or of the heating apparatus thereof, in any city. Nov. 1, 1889. Oct. 1, 1894. May 1, 1895.

Class 9. All members of the regular or permanent and any call member of the fire force of any city (as defined in Rule 1), except Boston. March 30, 1885. March 1, 1893. July 1, 1905.

Class 10. All truant officers in the city of Boston. Nov. 1, 1893.

Class 11. Superintendents, assistant superintendents, deputies and persons, other than the chief superintendents of departments, performing any of the duties of a superintendent in the service of any city of the Commonwealth. Feb. 15, 1897.

Class 12. Civil engineers, surveyors, draughtsmen, transitmen, levellers, chainmen, rodmen, and all assistants, under whatever designation, except laborers, in the service of the Commonwealth or any city thereof. Feb. 15, 1897. State, March 1, 1902.

Class 13. Architects and architectural draughtsmen, and all assistants, under whatever designation, except laborers and mechanics, in the service of the Commonwealth or any city thereof. July 1, 1905.

Class 14. Electricians, electrical engineers, and all assistants, under whatever designation, above the grade of linemen, employed in the service of the Commonwealth or any city thereof. July 1, 1905.

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Qualifications.

Rule 8.

Residence of applicants.

1. An applicant for appointment to any position to which these rules apply must be a citizen of the United States, who has resided in the Commonwealth for one year next preceding the date of his application; and if the application is for appointment to a position in the service of a city, the applicant must also have resided in the city in which he seeks service for six months next preceding the date of his application; but these restrictions shall not apply to applicants for positions in which special qualifications are required, or when, in the opinion of the commissioners, it would prevent the establishment of a suitable eligible list.

Rule 9.

Disqualifications for appointment.

1. No application for appointment will be received from any vendor of intoxicating liquor or any person habitually using intoxicating beverages to excess; or from any person who, within the year preceding his application, has been convicted of any offence against the laws of this Commonwealth; and the name of any such person may be removed from any eligible list.

Rule 10.

Moral character.

1. A good moral character is an essential qualification, and is of paramount importance in determining an applicant's right to admission to the eligible list.

Burden of proof.

2. The burden of proof of good character shall in all cases be upon the applicant, who may be required by the commissioners to furnish evidence thereof additional to the certificates required in his application.

Failure to prove good character.

3. Failure by the applicant to prove good character shall exclude him from examination and from the eligible list; and proof at any time produced to the commissioners of the bad character or dissolute habits of an applicant or eligible, of any criminal or disgraceful act committed by him or his dismissal for good cause from the public service, shall be sufficient to exclude him from examination or to remove his name from the list of eligibles.

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4. No person shall be so excluded from examination, and no one shall be removed from the eligible list, under this rule, except after an opportunity to be heard and upon a finding of the commissioners and a record thereof, containing the names of the commissioners voting therefor and a statement of the grounds of their action. Applicant entitled to a hearing.

RULE 11.

1. In Schedule B there shall be the following requirements of age, height and weight: — Requirements.

a. In class 1 applicants for appointment as metropolitan park police officers and as officers in the State Prison and Massachusetts Reformatory shall be not less than twenty-five and not over forty years of age at the time of filing the application, and must be not less than five feet seven inches in height and weigh not less than one hundred and thirty-five pounds; *provided, however*, that the requirements as to age shall not apply to veterans seeking appointment as metropolitan park police officers or as officers in the Massachusetts Reformatory. Amendments. Oct. 1, 1894, and Feb. 1, 1900.

b. In class 2 [the fire force of Boston] applicants for appointment must be not less than twenty-two nor over thirty years of age at the time of making application; *provided, however*, that applicants for appointment in the call force of the fire department of Boston, who are serving as call substitutes in said department, may, for the purpose of making themselves eligible under the rules for examination, deduct from their actual age any time not exceeding five years during which they have served in such capacity; and *provided, further*, that applications for appointment to the force may be made by persons serving in the call force who are under forty years of age. Amendments. Oct. 1, 1894, and Feb. 15, 1897.

c. In class 3 [the police force of any city other than Boston] applicants for appointment must be not less than twenty-two nor over forty years of age, and applicants for appointment to the district police force must be not less than "twenty-five nor over forty years of age at the time of filing the application;" *provided, however*, that this limitation as to age shall not apply to veterans, except as otherwise provided by law.* In all cases in this class applicants Amendment. Feb. 1, 1888. Amendment. Oct. 1, 1894.

* See chapter 413, Acts of 1902.

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must be not less than five feet seven inches in height and weigh not less than one hundred and thirty-five pounds.

Amendment. March 16, 1891.

d. In class 4 [the police force of Boston] applicants for appointment must be not less than twenty-five nor over thirty-three years of age at the time of filing the application, and must be not less than five feet eight inches in height and weigh not less than one hundred and forty pounds.

Amendment. March 1, 1893.

e. In class 9 [the fire force of cities other than Boston] applicants for appointment in the permanent force shall be not less than twenty-two nor over thirty-five years of age at the time of making application; *provided, however*, that call men serving in the fire department, in making application for the permanent force, may deduct from their actual age any time not exceeding ten years during which they have continuously served in such capacity.

Amendment. Nov. 1, 1893.

f. In class 10 [Boston truant officers] applicants for appointment shall be not less than thirty nor over forty-five years of age at the time of filing the application.

Amendment. Oct. 1, 1894.

2. All applicants for positions to which this rule applies shall be measured in bare feet and shall be weighed without clothing; and, except as provided in this rule, there is no requirement as to age, height or weight; *provided, however*, an age limit may be recognized, if deemed expedient by the commissioners, except in case of a veteran.

Application.

Rule 12.

Applications, how made.

1. Applications for positions in the first division of the classified service may be made at any time, and shall be on blank forms prescribed by the commissioners; and shall contain the information required by law, and a statement that the applicant does not habitually use intoxicating liquors to excess, is not a vendor of intoxicating liquors, and that he has not within one year been convicted of any crime against the laws of the Commonwealth. Applications for appointment to positions in the service of the Commonwealth and of the city of Boston shall be filed in the office of the commissioners in Boston.

Applications for appointment to positions in the service of a city other than Boston shall be filed with the secretary of

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the local board of examiners in such city, or at such other place as the commissioners shall designate.

2. Each application must be supported by certificates of good moral character, health, and physical and mental capacity for doing the public work, the certificates to be in such form and number as the commissioners shall prescribe. Must be supported by certificates.

3. Each veteran filing an application shall furnish with his application evidence of his honorable discharge from the army or navy of the United States. Application of veteran.

RULE 13.

1. Any person possessing the required qualifications, who has taken an examination, may make a new application for the same service at any time after the result of such examination is determined; and if he fails to pass, or to complete his examination in regular course, his name shall be stricken from the eligible list; and if he passes such examination, he shall rank in accordance with the result. New application.

RULE 14.

1. Every false statement knowingly made by any person in his application for examination and every connivance by him at any false statement made in any certificate which may accompany his application, or any complicity by him in any fraud, shall be regarded as good cause for excluding him from the eligible list, or for his removal or discharge after appointment. Effect of false statements.

RULE 15.

1. Defective applications will be returned to applicants with a notice to amend the same. Whenever the application shows that the applicant is not qualified under the rules and regulations, the application will be rejected, and the applicant notified of the reason therefor. Defective applications returned.

RULE 16.

1. The date of the reception of each application shall be endorsed thereon, and the application recorded; and if the applicants for admission to any class are in excess of the number that can be examined at a single examination, they will Reception of applications and notice to applicants.

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be notified to appear in the order in which their applications are received; *provided, however,* that veterans shall have precedence in such notification.

Examination.

Rule 17.

Examinations, character, notice of.

1. All examinations shall be absolutely impartial, practical in their character, and with paramount regard to matters which will fairly test the relative capacity and fitness of the persons examined for the service which they seek to enter.

Political or religious opinions not to influence appointments.

2. No question in any examination shall relate to political or religious opinions or affiliations, and no appointment or selection to an office, or for employment within the scope of these rules, shall be in any manner affected or influenced by such opinions or affiliations.

Time and place of examination.

3. The examinations shall be held at such times and places as the commissioners may designate, and proper notice thereof given. So far as practicable, the examination of applicants for appointment in the service of a city shall be held therein.

Rule 18.

Subjects of examination designated. Amendment, Feb. 1, 1900.

1. The subjects of examination may be designated from time to time by the commissioners, and shall be such as the needs of the service require, and such as tend to prove the qualifications of the applicant for the office sought; and for this purpose the commissioners may subdivide any of the classes provided under the rules.

How graded.

2. Proficiency in any subject shall be credited in grading the standing of the person examined, in proportion to the value of a knowledge of such subject in the branch or part of the service which the applicant seeks to enter.

Per centum of proficiency fixed by commissioners.

3. No one shall be entitled to be certified for appointment whose standing upon a just grading in the examination shall be less than the per centum of proficiency from time to time fixed by the commissioners.

Examinations where special skill and experience are required.

4. The commissioners may also order examinations upon other subjects of a technical or special character, to test the capacity which may be needed in any part of the classified service which requires peculiar information or skill.

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Rule 19.

Physical examinations.

1. Where physical qualifications are necessary, the commissioners will provide for examinations to determine them.

By whom made. Amendment. Oct. 1, 1894.

2. The examinations to test the physical soundness of applicants for positions in the classified service shall be made by the medical examiners, if for the Commonwealth service, and by the city physicians or their assistants, if for city service, and by the town physician, if for town service, unless the commissioners shall appoint a physician to conduct such examinations. The results of such examinations shall be certified on blanks furnished by the commissioners.

Additional physical examination.

3. Each applicant in any of said classes may be required to undergo such further physical examination as the commissioners may prescribe, adapted to ascertain his special fitness for the service for which he has applied. Any such examination shall be made by a suitable examiner, to be designated by the commissioners, and the result shall be recorded upon blanks provided for the purpose.

Persons examined to be notified.

4. Each person examined shall be notified of the result of his examination.

Eligible List.

Rule 20.

When examined, applicants shall be graded.

1. Those examined shall be marked and graded, and shall have their grade entered upon a register. Separate registers may be kept of those seeking to enter any part of the service in which special qualifications are required.

Veterans eligible without examination. Amendment. Feb. 15, 1897.

2. Every veteran applying for appointment without examination, who shall have furnished satisfactory evidence that he possesses the qualifications claimed in his application, shall have his name entered upon an eligible list without examination.

Eligible two years.

3. No person shall remain eligible more than two years upon any eligible list, unless the list is of persons possessing special qualifications; in which case the commissioners may by vote from time to time continue the eligibility beyond said period, and until another list is established.

Amendment. Feb. 1, 1900.

4. When a person has been regularly certified and appointed under the rules, and then suspended from employment, he

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may at any time within one year of such suspension, if within two years of the time his name was placed upon the eligible list, have his name restored to such list, to the same effect as though not certified.

Requisition and Certification.

Rule 21.

Requisition.

1. Whenever there is a vacancy to be filled in the classified service, the appointing officer shall make requisition upon the commissioners for the names of eligible persons.

Rule 22.

Certification of eligible persons. Amendment. Feb. 15, 1897.

1. Whenever any appointing officer shall make requisition not expressly calling for women, the commissioners shall certify only the names of all veterans who have passed the examination for the position sought, in the order of the respective standing of such veterans upon the eligible list, and the position must be filled by the appointment and employment of some veteran so certified, before the names of persons not veterans can be certified; and in case there is no such veteran upon the list, then the commissioners shall certify the names of the three persons most eligible upon the list. In case such officer shall in the requisition request the certification of women, the commissioners shall certify the names of the three women most eligible.

Appointment.

2. The appointment and employment shall be made from the list of names so certified, subject to the provisions of the following section: —

Certification of veterans.

3. Whenever any appointing officer shall in the requisition so request, the names of any or all veterans registered shall be certified, and any of the veterans so certified may be appointed and employed in the office or position sought.

When certification becomes void.

4. Unless an appointing officer shall, within four weeks of any certification of names to him by the commissioners, make and notify the commissioners of an appointment from the names certified, the certification shall become void unless said period of four weeks is extended by vote of the commissioners.

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RULE 23.

Certification of specialists. Amendment. Feb. 1, 1900.

1. Whenever the commissioners are notified that proficiency in any special subject, or the possession of any special qualification or experience, is needed in the position to be filled, they may certify the names of three persons on the eligible list having the highest standing in such special subject, or possessing such special qualification or experience; or they may certify from any list of eligibles in any class, if by them deemed suitable.

RULE 24.

No person to be certified more than three separate times, except, etc.

1. No person on any register shall be certified more than three separate times for the same office, except upon the request in writing of the appointing officer; *provided, however,* if the office requires special or expert qualifications, persons may, in the discretion of the commissioners, be certified more than three times.

Certification, method of.

2. In any requisition to fill one vacancy, three names shall be certified. In case the appointing officer shall make requisition to fill more than one vacancy, the number of eligibles therefor shall be certified as follows: for two vacancies, four names; for three vacancies, five names; then for each multiple of three vacancies, the same multiple of five names; for one vacancy over a multiple of three, three names additional to those prescribed for such multiple; for two vacancies over a multiple of three, four names in addition to those prescribed for such multiple; *provided, however,* veterans shall be certified as hereinbefore provided.

Appointments from list certified.

3. Whenever an appointing officer, who shall have made a requisition to fill a certain number of vacancies, shall appoint a smaller number than that of the vacancies named by him, he shall not make the selection from the whole number certified to him, but only from that number of names standing highest upon said list that would have been certified to him had the requisition stated the number of vacancies which he actually filled.

RULE 25.

Sex.

1. If any law, regulation or requisition shall call for persons of one sex, those of that sex shall be certified; otherwise sex shall be disregarded in certification.

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RULE 26.

Certification of additional names.

1. Upon proof satisfactory to the commissioners of the advisability of so doing, they may certify an additional name; but in every such case the reason for so doing shall be stated in such certification.

APPOINTMENT.

RULE 27.

Appointment.

1. No person shall be appointed in the classified service in the first division except in the manner provided in these rules.

2. The appointing officer, if the vacancy is filled, must appoint and employ a person from the list certified under these rules.

3. No person shall be regarded as appointed within the requirement of these rules unless he is notified of his appointment, and, if he accepts the position, is actually employed.

RULE 28.

Substitutes, specials and supernumeraries. Amendment. Feb. 1, 1900.

1. No person serving temporarily, or as a substitute, special or supernumerary official, under whatever designation, in any position in the classified service, shall be appointed to any permanent position without requisition and due certification; except where a reserve police force has been established by law in any city, in which case any appointment to the permanent force shall be made from the reserve force, and may be made without further civil service examination or certification, provided the person to be appointed shall have served at least six months upon the reserve force.

RULE 29.

Original appointments shall be for a probationary period.

1. Every original appointment and employment in the permanent service in the first division shall be for the probationary period of six months; at the end of which time the probationer shall become, by lapse of the probation period, permanently appointed or employed; unless the appointing officer at or before the expiration of said period notifies the person appointed and the commissioners that the probation-

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er's conduct or capacity has not been found satisfactory, in which case the employment of the appointee from the date of such notice shall cease, and he shall be deemed to be out of the service.

RULE 30.

Appointing officer to be furnished with examination papers, etc.

1. In the selection from the persons whose names are certified by the commissioners, the appointing officer, upon written requisition therefor, will be furnished with the applications, the certificates and examination papers of the persons certified; and, in the exercise of his responsible power of selection, he may summon personally before him the certified persons for such inquiries as he may deem proper. All papers furnished upon requisition as above must be returned to the commissioners with the notice of selection.

RULE 31.

When a person holds exempted position, etc.

1. When a person holding a position exempted from civil service classification is also appointed to a position which falls within the classification, and the pay of which, in the opinion of the Civil Service Commissioners, is nominal, and the duties of which are incidental to those of the unclassified position, the commissioners may treat such appointment as provisional, and allow the employment to continue while such person is holding the unclassified position.

Provisional appointment. Amendment. Oct. 1, 1894.

2. If there is no suitable eligible list, and the commissioners are unable to comply with a requisition, they may, in their discretion, allow a provisional appointment, which may continue until a list of eligibles is obtained by examination; or they may authorize the appointing officer to select a suitable person, who shall be subjected to a non-competitive examination, and, if found qualified, shall be certified for appointment; *provided, however,* that, whenever practicable, a competitive examination of applicants for the office shall be held; and *provided, also,* that whenever a provisional appointment has been made under this rule, and the condition of the employment of the person appointed has been changed either by increase of pay or change of duties, the provisional employment of such person shall cease.

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Rule 32.

Commissioners to be notified of person selected, etc.

1. Every appointing officer shall, within ten days, give notice in writing to the commissioners of the name, salary and place of residence of any person appointed and employed in a position, and of the transfer, promotion, resignation or removal, discharge or death, of any person serving under him, with the dates thereof.

Reappointment.

Rule 33.

Reappointment, no examination for. Amendment. Feb. 15, 1897.

1. No examination shall be required upon a reappointment of any person to the same office immediately upon the expiration of his term of office.

Reinstatement of persons dismissed. Amendment. Feb. 15, 1897.

2. Any person appointed to and employed, in accordance with the civil service rules, in any position in the first division of the classified service, who shall be found or certified to the commissioners by the proper authorities to have been dismissed or separated therefrom without fault or delinquency on his part, may be reinstated without further examination, in the same part or grade of such service, within six months next following such dismissal or separation.

Temporary Service.

Rule 34.

No person shall be appointed for temporary service, unless regularly certified, except, etc. Amendment. Oct. 1, 1894.

1. Appointments in the first division for temporary service shall be made in accordance with the civil service rules, except in case of emergency, where the public business would suffer from delay in filling the position as herein provided. In no case shall such appointment or employment for an emergency continue for more than ten days; and no reappointment or employment of the same person, or of another to the same position at the end of such period, shall be allowed, except by consent of the Civil Service Commissioners. In every such case the officer making the appointment, or furnishing the employment, shall report the same to the commissioners within five days, with the reason therefor and the time for which the temporary appointment or employment is necessary.

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Transfer.

Rule 35.

Transfer without examination.

1. Transfer within the classified service without examination may be made from a position in one department, office or institution, to a similar position in another department, office or institution, upon the consent in writing of the heads of the respective departments, offices or institutions, and of the commissioners.

Amendment. Feb. 1, 1900.

2. A person in one class of the first division may be transferred upon non-competitive examination to a different position in that or any other class, provided such person shall have served at least one year in the former position, including any time of probationary service.

Promotion.

Rule 36.

Amendment. Oct. 1, 1894.

1. Promotions, within the several schedules and classes of the first division of the classified service, except as hereinafter provided, shall, so far as practicable, be made by successive grades, and shall be by competitive or non-competitive examination, except as otherwise required by law; *provided, however,* that no person shall be promoted who has not served at least one year in the lower position.

Fire service.

2. Promotions from the call to the permanent fire force in any city except Boston shall be by competitive examination; *provided, however,* that no application for examination for such promotion shall be filed by a call man who is over forty-five years of age.

Police service.

3. Promotions in class 3 of Schedule B shall, so far as practicable, be by successive grades and by competitive or non-competitive examination, as the commissioners may determine; *provided, however,* that no special, supernumerary, substitute, reserve or temporary police officer, under whatever designation except where a permanent reserve force in any city has been established by law, shall be promoted to the regular or permanent force, or assigned to permanent duty, except after competition with all applicants for said force.

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Veterans preferred in promotion. Amendment. Sept. 1, 1900.

4. In all cases of promotion under this rule, any veteran in the grade from which the promotion is to be made shall be entitled to apply for examination, and upon passing the examination shall be preferred in such promotion.

Offices not included in Rules.

Rule 37.

Applicants for offices not covered by rules may be examined.

1. Upon the request of any officer or board having the power of appointment to any office or position in the service of the Commonwealth or any of the cities thereof, to which these rules do not apply, the commissioners will furnish names from any list of eligible persons to fill a vacancy in such office or position; or they will, whenever practicable, hold competitive or non-competitive examinations for such office or position.

SECOND DIVISION.

Labor Service.

Rule 38.

Amendment. Feb. 1, 1900. Word "laborer" defined.

1. The word "laborer," in these rules, shall be construed to include mechanics, engineers, janitors, linemen, reelmen and all men doing work connected with electrical appliances, laborers, whether skilled or unskilled, under whatever designation, and boys employed in the labor service of any city, except where persons who would otherwise be included in any of these classes are classified in the first division.

Classification.

2. The labor service shall constitute the second division of the civil service. Under it there shall be two schedules, Schedule C and Schedule D. Schedule C shall include all laborers as herein defined in the employ of the city of Boston, to be designated as the labor service of Boston. Schedule D shall include all laborers as herein defined in the employ of any city other than Boston to which these rules are or may become applicable, to be designated as the labor service of such city.

Registration.

3. The commissioners shall provide for the registration and certification of laborers in the city of Boston, and in other cities to which the labor rules are or may become applicable.

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4. In Schedule D the commissioners may, in their discretion, discontinue registration and certification whenever a city shall fail to appropriate such sum of money as, in their opinion, is necessary to provide for the full enforcement of all rules and regulations relating to the labor service of such city. Notice of their action in each case shall be certified to the authorities of such city, and shall be published in one or more newspapers therein. Commissioners may discontinue registration.

Labor Application.

Rule 39.

1. Laborers shall apply for registration at the civil service labor office in the city where they seek employment. Where registered.

2. Applicants must be citizens of the United States, who have resided in the Commonwealth for one year and in the city in which they seek employment for the six months next preceding the date of the application, except in special cases, where the commissioners are unable to obtain a sufficient number of citizens and residents to meet the demands of the departments. Must be citizens.

3. No application will be received from a vendor of intoxicating liquor, or from any person habitually using intoxicating beverages to excess, or from any person who within the year preceding his application has been convicted of any offence against the laws of this Commonwealth. Vendor of liquor cannot apply.

4. Every application must be supported by certificates of good character, and any false statement knowingly made by any applicant for labor service, or any connivance at any false statement made in any certificate accompanying his application, or any complicity in any fraud, shall be good cause for removing his name from the register, or for his discharge after employment. No applicant shall remain eligible more than one year from the date of his registration, except upon personal application for a renewal. The commissioners, for due cause, may reject any application for such renewal. Application supported by certificates.

5. Every applicant who produces satisfactory evidence of his capacity for labor and his habits as to industry and sobriety shall be registered in the order of his application. He shall state under oath his (1) name, (2) age, (3) residence, Laborers, how registered. Amendment. Feb. 15, 1897.

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(4) citizenship, (5) the number and relationship of persons depending upon him for support, (6) service as a veteran, (7) previous occupation, (8) personal description, and such other information as may be required.

Applicants shall file certificates. Amendment. Feb. 15, 1897.

6. Every applicant shall file a certificate, signed by two reputable citizens, to the effect that he is qualified to perform the labor sought. Every applicant claiming preference as a veteran shall also produce satisfactory evidence of the fact.

Additional certificates.

7. When the applicant desires to be registered for any other service than that of common laborer, he will be required to furnish a certificate from some competent person or persons of his ability to do the kind of work for which he alleges capacity and for which he desires to be certified, and he may file additional certificates of capacity for special service.

When certificates are inconsistent.

8. In case any applicant shall present any certificate in regard to his qualifications in previous work, inconsistent with his application or previous certificates, the commissioners may refuse to register him, or may remove his name, if registered, from the list.

Certificate from employing officer. Amendment. Feb. 15, 1897.

9. No certificate from an employing officer in regard to the capacity of a laborer applying for registration shall be received unless the laborer has been legally employed in the department, and the employing officer has an official knowledge of his capacity.

Removal from register.

10. In case any applicant is found by the commissioners to be unfit or in any way disqualified to perform the service which he seeks, his name shall not be entered on the register, and, if on the register, shall be removed therefrom, and the reason shall be endorsed on the application.

May require examinations. Amendment Feb. 15, 1897.

11. The commissioners may in their discretion provide and require examination regarding the qualifications of any applicant.

Labor Requisition and Certification.

Rule 40.

Requisition and certification. Amendment. Feb. 15, 1897.

1. When laborers are required, the employing officer shall make requisition upon the commissioners, stating the number of men wanted, the precise nature of the labor in which they are to be employed, and the time and place of employ-

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ment. Upon such notice, the commissioners shall certify the names of any and all veterans upon the eligible list, and the employment must be made from the list so certified; *provided,* that, after the employment of veterans, in case there is not a sufficient number of veterans so registered and qualified for the required labor, the commissioners shall certify twice the number of men called for, over and above the number of veterans, if any, certified, making an impartial selection, giving preference, *first,* to those who have worked satisfactorily for three months or more in the department, and, *second,* to those having families dependent upon them for support.

Requisition for young men. Amendment. Feb. 15, 1897.

2. In case the employing officer shall in the requisition certify that the labor to be performed is so arduous as to require the services of young and vigorous men, and shall designate a maximum age limit, the commissioners may in their discretion recognize such age limit.

When unable to fill requisition.

3. Whenever the commissioners shall be unable to fill a requisition, they may authorize the employing officer to make the selection. The persons so selected shall, before being employed, present themselves at the civil service labor office in their city for registration in the manner and under the rules and regulations prescribed for applicants, and be certified by the commissioners; and such persons shall not be employed at any other kind of work than that for which they were selected, until after they shall have been continuously so employed for at least three months.

Labor Employment.

Rule 41.

Employment from list certified.

1. The selection and employment shall be made from the list certified, and the employing officer shall, before selecting or employing any other person, first employ from the list of veterans certified, and the names of those employed shall be returned to the commissioners within five days after such employment.

Certification of veterans.

2. Whenever the employing officer shall request the certification of any or all veterans registered for any particular kind of work, they shall be certified, and any of the veterans so certified may be employed.

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Method of selection.

3. Whenever an employing officer, who shall have made a requisition for a certain number of laborers, shall employ a smaller number, he shall not make the selection from the whole list certified to him, but only from that number of names standing highest on the list that would have been certified to him had the requisition stated the number of men which he actually employs under the certification, except in the case of the certification of veterans, when he may employ any veteran certified.

Certification of additional names.

4. Upon proof to the commissioners that a person certified as a laborer is unsuitable for the work, the commissioners may certify an additional name.

Return of persons employed.

5. When the employing officer has selected and employed such of the persons named in said list as he may require, he shall within five days after their employment return to the commissioners' office a list of the persons so selected and employed, stating the kind of work for which they have been employed. In case any of the persons certified fail to respond, or decline the employment offered, or withdraw from the service without good cause, the names and registered numbers of such persons shall be returned to the commissioners, with a statement of the facts; and the names of such persons shall be taken from the register, unless a satisfactory explanation of the failure or refusal to work is given.

Emergency.

Rule 42.

Selection in cases of emergency. Amendment. Feb. 15, 1897.

1. In cases of emergency which cannot be foreseen, where the department would suffer from delay in filling a vacancy in the labor service, as herein provided, the employing officer may temporarily employ persons, without requisition; *provided, however,* that in no case shall such temporary employment continue for more than five days, and no re-employment of the same person at the end of such period shall be allowed; and in every such case the officer shall report the employment to the commissioners within five days, with the reason therefor, stated in such form and detail as the commissioners may from time to time prescribe.

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Suspension and Transfer.

Rule 43.

1. Any laborer suspended and not actually employed in the department in which he is enrolled shall, at the end of six months after the time within which he may apply for a hearing under the provisions of law,* be deemed to be out of the service, and shall not be thereafter employed, except after registration and certification by the commissioners; and the employing officer shall forthwith report to the commissioners the name of any laborer so suspended; *provided, however,* that this provision shall not apply to veterans.

Suspension for six months. Amendment. Feb. 15, 1897.

2. No laborer shall be employed in work other than that for which he is certified until after actual and continuous employment therein for at least three months; *provided, however,* that this provision shall not apply to veterans.

Not to be employed in work other than that for which certified. Amendments. Feb. 15, 1897, and Feb. 1, 1900.

3. Heads of departments may, with the consent of the commissioners, transfer laborers from one department to another, upon previous notice to the commissioners, provided such laborers have been continuously employed in the same work in the same department for which they were certified for at least three months.

Transfer.

Reinstatement.

Rule 44.

1. Any laborer who shall be found by the commissioners to have been dismissed or separated from the service without fault or delinquency on his part, may, upon request of the employing officer, be reinstated in such service in the same department within three months next following such dismissal or separation.

Reinstatement. Amendment. Feb. 15, 1897.

Labor Discharge.

Rule 45.

1. When a person is discharged from the labor service for "loitering," "incompetence," "insubordination," "unsatisfactory work," or any equivalent cause, unless the charge is disproved, he shall not be eligible for registration again for

Discharges.

* See chapter 314, Acts of 1904.

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a period of at least six months from the date of such discharge. At the end of that time he can apply for registration on the same basis as other citizens; and, in case he is registered, he shall not be eligible to certification to the department from which he was discharged except with the written consent of the head of that department.

2. When a person is discharged from said service for "intoxication," and the charge is not disproved, he shall not be eligible for registration again for a period of at least a year from the date of such discharge; and his registration then will be subject to the conditions above prescribed.

3. In case a person is discharged a second time for good cause, he shall not be eligible for registration again except by special vote of the commissioners.

The foregoing rules, prepared by the Civil Service Commissioners, are hereby transmitted to the Governor and Council for their approval.

CHARLES H. PORTER,
BENTLEY W. WARREN,
FRANK FOXCROFT,
Civil Service Commissioners.

MARCH 14, 1905.

Approved in council, March 29, 1905.

EDWARD F. HAMLIN,
Executive Secretary.

A true copy.
Attest: WARREN P. DUDLEY,
Secretary of Civil Service Commissioners.

Due notice was given that the foregoing civil service rules would take effect on the first day of July, A.D. 1905.

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REGULATIONS

ADOPTED BY THE

CIVIL SERVICE COMMISSIONERS.

[Dec. 27, 1901.]

Chief Examiner.

1. The chief examiner shall, so far as practicable, attend the examinations held by the several boards of examiners.

2. He shall take care to secure accuracy, uniformity and justice in the proceedings of all examiners and boards of examiners under the rules and regulations; and such proceedings and all papers appertaining thereto shall at all times be open to him. He shall also, from time to time, inspect the proceedings and papers connected with examinations under the civil service rules, and shall make report of such inspection to the commissioners.

3. He shall prepare and submit to the commissioners proper schemes for examinations, and forms for blanks and records.

4. He shall take care that the rules and regulations are complied with, and shall bring any case of their infraction, or of injustice or irregularity, observed by him, to the attention of the commissioners. It shall be his duty, from time to time, to confer with the heads of departments, offices and institutions of the Commonwealth, and the several cities thereof, concerning the regularity, sufficiency and convenience of the examinations for the service under them. He shall perform such other appropriate duties as may be specified in these regulations, or otherwise assigned to him by the commissioners.

Secretary.

5. The secretary shall keep the records of the proceedings of the commissioners, and have charge of, and be responsible for, the safe keeping of the books, records, papers and other property in their office. He shall make such certification as the commissioners may direct of those eligible for appointment or employ-

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ment. He shall generally conduct the correspondence of the commissioners, and perform such other appropriate duties as they may assign to him.

REGISTRAR OF LABOR.

6. The registrar of labor shall keep the records of his office and be responsible for the safe keeping of records, books, papers and other property in the labor office; he shall make proper certifications of those eligible for employment in the labor service, and he shall generally superintend the work of the office and supervise the administration of the civil service rules applicable to the classified labor service.

EXAMINERS.

7. Regular boards of examiners shall consist of not less than three nor more than five members, one of whom shall act as secretary; and a majority of any board may conduct an examination in the absence of the other members.

8. The board of examiners for each city shall promptly notify the commissioners of the need of holding an examination in and for such city; and thereupon the chief examiner shall, under the direction of the commissioners, issue authority therefor, and shall prepare questions and supervise the other preliminary arrangements.

9. The boards of examiners shall conduct the examinations, and estimate and mark the standing of the persons examined, or in a non-competitive examination shall mark the qualifications of the person examined.

10. Special boards will be selected, and special regulations for examinations will be issued by the commissioners when expedient.

11. No examiner or person serving under the commissioners shall attempt to influence the selection of any person for the civil service.

12. The examiners shall preserve order and decorum at examinations, and prevent any interference, by conversation or otherwise, with those under examination.

13. Each examiner will exercise diligence in securing fairness and preventing collusion and fraud in the examinations.

14. No examiner shall disclose, unless by consent of those examined, the results of the examination.

15. Any person, after receiving official notification of his standing, as ascertained by a competitive examination, may, in person or by duly authorized agent, inspect his examination papers.

16. Complaints of any injustice or unfairness on the part of

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any examiner or examining board, or by any one acting under the commissioners, may be made in writing to the commissioners, who will act as substantial justice in the premises may require.

17. Each examiner shall be entitled to receive from the appropriation for the expenses of administering the civil service law twenty cents for each applicant whose examination he shall attend, and twenty cents additional for each set of examination papers he shall mark; the total number of papers prepared by one applicant being considered a set. For the additional service rendered by the secretary of each board of examiners of cities other than Boston, in registering the eligibles, certifying the same, conducting necessary correspondence, and in other ways, he shall be entitled to receive from the same appropriation the additional sum of twenty-five cents for each eligible so registered. [3, 24, '93.]

18. No person shall act as examiner in any examination of applicants for admission to the classified civil service, when he is an applicant or an eligible for a position in the class for which the examination is being held. [12, 21, '94.]

Competitive Examination.

19. Applicants must present themselves punctually at the times and places specified in their official notices to attend, and they will be admitted to examination upon the production of such notices.

20. Each applicant in a competitive examination shall first be presented with a declaration paper, on which he will write his name, age, residence, examination number, etc., after which he will place it in an envelope, seal the envelope, and thereafter he shall mark each paper with his examination number only. The envelope shall not be opened until after all his examination papers are marked.

21. The sheets of questions will be numbered, and will be given out in the order of their numbers, each after the first being given only when the competitor has returned to the examiners the last sheet given to him. In general, no examination shall extend beyond five hours. Each applicant must complete his examination on the obligatory subjects before taking up any of the optional subjects.

22. The subjects of, and the time allowed for, the examination, will be announced before the first paper is given out.

23. Applicants for appointment in classes 2 and 4, Schedule B (the fire and police departments of the city of Boston), shall be examined to test their physical soundness, and no one who fails to pass such examination shall be eligible for appointment.

24. Each applicant who shall have passed such examination, and also the educational examination, shall be required to undergo

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such further physical examination as the commissioners may from time to time prescribe, adapted to ascertain his special fitness for the service for which he has applied.

25. Such examination shall be made by a physical examiner, to be appointed by the commissioners, and shall be recorded upon blanks provided for the purpose, upon which each required qualification shall be entered, and shall be marked with the percentage of excellence which the several applicants shall respectively be found to possess.

26. The percentage of each qualification shall be multiplied by the weight prescribed for each by the commissioners; and the quotient found by the division of the aggregate of value so arrived at, of each applicant, by the aggregate of weights shall constitute the percentage of condition of such applicant.

27. When an applicant for police or fire service in Boston fails to obtain sixty-five per cent. in either strength tests or development, he shall not be re-examined in those subjects until after he has filed a new application and undergone another examination as a new applicant. [1, 9, '91.]

28. To determine the standing of applicants for appointment in Class 4, Schedule B (the police force of Boston), equal weight shall be given to the physical and educational examinations; in Class 2, Schedule B (the fire force of Boston), the comparative weight to be given to each of such examinations shall be three to two. [1, 30, '94.]

29. Applicants for fire service in Boston, who have passed the examination and are on the eligible list for appointment to the permanent substitute force, may be certified for appointment to the call force upon the percentage obtained in their educational examination: *provided, however*, that such certification, or appointment in the call force, shall not affect their standing on the eligible list for the permanent substitute force.

30. Applicants for positions as watchmen and turnkeys in the State Prison and Massachusetts Reformatory shall undergo such physical examination as the commissioners may prescribe.

Non-competitive Examinations.

31. In cases where a non-competitive examination may be needed, either to test the capacity of applicants for any part of the service which requires peculiar information or skill, or to fill a position for which there are no suitable candidates on the eligible list, or for promotion, or temporary appointment, or otherwise, the commissioners will provide for such examination.

32. Applicants for non-competitive examinations shall fill out and make oath to the proper application paper (without certifi-

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cates); but any person named by the appointing power for non-competitive examination may file such paper at any time before undergoing the examination.

33. The non-competitive examination shall conform, as nearly as practicable, in subject, questions and marking, to the competitive examination of the same grade.

34. Non-competitive examinations shall, in the absence of any special regulations to the contrary, be conducted by the chief examiner, and the papers marked by him with the assistance of such person as he may select.

Special Examinations.

35. Applications for any special examination must be made in the form prescribed by the commissioners, and must be accompanied by certificates, as required in cases of ordinary applications.

36. Whenever a special examination is to be held, proper notice shall be given by advertisement or otherwise.

37. Each special examination shall embrace the subjects approved by the commissioners, after consultation with the head of the office concerned, or the special examining board for such office; and shall, so far as appropriate, be conducted under the general regulations, as to the marking of examination papers and the grading of persons examined.

38. A special record of applicants, and a special register of eligible persons, shall be kept for each part of the service, or office requiring special examinations; and when the commissioners or the proper examining board shall be notified by the appointing officer of a vacancy in such part of the service, certification shall be made to him of the names of the three persons graded highest on the special list of persons eligible for the same.

39. In case competent special applicants do not apply, after suitable notice, the appointing officer may be authorized to select a person for non-competitive examination.

Marking.

40. Each examination paper shall be reviewed by a majority of the examiners conducting the examination; and, in any case of disagreement, the average of the markings made on any question or paper by all shall be the final marking on such question or paper.

When a question has arisen regarding the exclusion of an applicant from examination under the provisions of the civil service rules, and the commissioners have voted to allow such applicant

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to take the examination, the examiners shall give the applicant the same credit for experience that he would have been entitled to if no such question had arisen. [3, 2, '06.]

41. The papers in each subject shall, whenever practicable, be examined, compared and marked before the papers in another subject are examined.

42. The marking of each question or subject shall be made on a scale of 100, which shall represent entire accuracy. Handwriting will be judged by its legibility, uniform and correct formation of letters and ease of execution. Upon a comparison of the handwriting of all, the best and worst should be first determined, and the two extremes of the scale thus fixed; the others should be marked relatively to them. In writing from dictation or copying from manuscript, the omission, repetition or substitution of words, the erasures, blots and other evidences of carelessness, will reduce the marking below 100. Abstracts or summaries of documents, and letter-writing, will be marked as in handwriting, by determining the best and worst examples; and the examiners, having marked these, will then mark the others proportionately.

43. In each of the other subjects, each question shall be marked on a scale of 100; and the sum of such markings, divided by the number of questions in that subject, shall determine the standing on such subject.

44. In marking the examination papers of applicants for police, prison and fire service, orthography shall not be marked as a subject to which a special weight is attached; but errors in orthography shall be taken into account in marking the exercises in copying, letter-writing and reporting.

45. The following examples show the method by which the standing of each competitor is obtained. The weights here given to the different subjects are not to be regarded as the standard weights; these, and also the subjects, will be varied to meet the requirements of the position to be filled.

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EXAMINATION OF_____

SUBJECTS.	Standing on Subjects.	Weight given to Subjects.	Product of Weight and Standing.
Penmanship,	80	4	320
Dictation,	75	2	150
Copying rough draft,	70	3	210
Orthography,	85	1	85
Arithmetic,	82	3	246
Composition,	70	2	140
	–	15	1,151
General average standing,	–	–	76.73

EXAMINATION OF_____

SUBJECTS.	Standing on Subjects.	Weight given to Subjects.	Product of Weight and Standing.
Penmanship,	85	4	340
Dictation,	90	2	180
Copying rough draft,	96	3	288
Orthography,	100	1	100
Arithmetic,	80	3	240
Interest and discount,	75	2	150
	–	15	1,298
General average standing,	–	–	86.53

EXAMINATION OF_____

SUBJECTS.	Standing on Subjects.	Weight given to Subjects.	Product of Weight and Standing.
Penmanship,	70	2	140
Copying,	80	2	160
Clearness and correctness of statement,	75	3	225
Experience,	80	3	240
Arithmetic,	70	2	140
Local data; duties,	70	3	210
	–	15	1.115
Educational qualifications,	–	–	74.33
Physical qualifications,	–	–	85.
	–	2	159.33
General average standing,	–	–	79.66

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It will be observed that the standing on each subject is multiplied by the weight given that subject, and the product placed in the third column; the sum of these products, divided by the sum of the weights, gives the general average standing.

Eligible List.

46. The names of those found eligible shall be enrolled upon a register in form prescribed by the commissioners.

47. Priority of date in examination will give no advantage in position on the eligible list.

48. The names of persons placed on the eligible list in Class 2 of Schedule A (the higher clerical service) may also, upon request in writing, be placed on the eligible list for positions in Class 1 of Schedule A, with the same standing.

49. Persons whose names are on the eligible list for the prison service of a city may, upon request in writing, have their examination papers marked by the State Board of Examiners; and, if they are found qualified, their names may be placed on the eligible list for the prison service of the Commonwealth. Persons whose names are on the eligible list for the prison service of the Commonwealth, who have been residents of the city in which they reside for six months, may, upon request in writing, have their examination papers marked by the board of examiners for the city in which they reside; and, if they are found qualified, their names may be placed on the eligible list for the prison service of said city.

Certification.

50. Certification of eligibles under the rules shall be as follows: —

For 1	vacancy	certify	3	names.	For 11	vacancies	certify	19	names.
2	vacancies	"	4	"	12	"	"	20	"
3	"	"	5	"	13	"	"	23	"
4	"	"	8	"	14	"	"	24	"
5	"	"	9	"	15	"	"	25	"
6	"	"	10	"	16	"	"	28	"
7	"	"	13	"	17	"	"	29	"
8	"	"	14	"	18	"	"	30	"
9	"	"	15	"	19	"	"	33	"
10	"	"	18	"	20	"	"	34	"

General Provisions.

51. In case a person upon any register shall, by reason of ill-health or physical incapacity, in the judgment of the commissioners, become manifestly disqualified for the service for which he

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or she is registered, the commissioners may direct that such person be not certified; and the commissioners must be informed by the proper examining boards of each case of such disqualification.

52. The applicant affected by such suspension, or refusal of an examination, may make complaint in writing to the commissioners, who will take proper action thereon.

53. The commissioners cannot advise persons as to vacancies in the service, nor furnish any information as to the duties, salaries, course of promotion, or other conditions of positions and offices, except such as may be found in printed regulations. No advice can be given as to the course of preparation that applicants should follow, nor can specimens of the examination papers be furnished.

54. Every application paper and accompanying certificates will remain on file in the office of the commissioners or boards of examiners, and under no circumstances or conditions will the originals be returned to the applicant.

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SPECIAL INSTRUCTIONS TO EXAMINERS.

The members of a Board of Civil Service Examiners will meet as soon as practicable, and organize the Board, choosing a chairman and secretary.

On receiving notice of such organization, the commissioners will forward to the secretary of the Board the application blanks, copies of the rules and regulations, and such other books, documents and papers as may be needful.

Each person filing an application blank should be furnished also with a copy of the rules and regulations.

When an application paper is presented by an applicant in person, the secretary should examine it at the time, if he can do so conveniently, and, if it is properly filled out, he should note upon the back, in ink, the date and hour when received. If it is not properly filled out, the attention of the applicant should be called to the fact, and he should be directed to have the application paper corrected.

If an incomplete application paper is received by mail, it should be returned to the applicant, accompanied by a notice to correct the same.

The applications, if found satisfactory, should be numbered serially in the order in which they are received. They should be entered in the record of applications, in the order of their numbers.

Any application which shows that the applicant is not, by reason of age, lack of citizenship, proper period of residence, etc., entitled by the law, rules and regulations to an examination must be returned to him with a brief statement of the reasons for such action. A blank form will be furnished for this purpose.

All application papers will be received, if in proper form. Should any be received for positions in the service of the Commonwealth, or another city, they must be forwarded to the commissioners.

When the application is for examination for the police service, the secretary of the Board will furnish the applicant with a copy of the book of instructions for police applicants, *and make note of having done so on the application paper.*

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Attention is called to Rule XIX., which gives precedence in notification to veterans.

Examination blanks will be sent or brought to the Board before an examination is to take place; but they are not to be opened until the Board meets in the examination room on the examination day, and great care must be taken that they be kept in a secure place until that time.

When all are seated, one of the Board will take from each applicant the notice he has received to attend the examination.

The package of examination papers will then be opened, and each applicant will be given a numbered envelope and a declaration paper; upon the latter are printed questions concerning his name, age, former occupation, service as a veteran, etc. These are to be answered in writing, and the writer will sign his name at the bottom of the sheet. This is the only time during the examination when the applicant will be allowed to affix his signature to a paper. After completing the declaration paper, he will fold and enclose it in the numbered envelope which has been given him, and then seal the envelope.

The number on the envelope will be his examination number, and he must write it upon each succeeding paper in the blank space left for that purpose.

It will be well to inform the applicants that they are to be examined in certain subjects, and state the order in which the subjects will be given out.

The envelopes are not to be opened until after all the examination papers have been marked and graded.

In examinations where one of the exercises consists of writing from dictation and spelling, all the applicants will work at the same time. In the other exercises they may consult their own convenience as to rapidity.

As a rule there will be no general recess during the examination hours; but any applicant may be allowed, for sufficient reason, to leave the room at any time when he has finished one set of questions and delivered the paper to one of the Board. No succeeding questions shall be given him, however, until his return.

It is advisable that the full Board of Civil Service Examiners be present at each examination; but a majority of the Board may conduct an examination in case of the disability or necessary absence of the other members.

Applicants should be cautioned not to use any books of reference or memoranda for the purpose of assisting their memories. Any one detected in doing so may be dismissed from the examination room. The same penalty may be enforced if one applicant attempts

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to assist another, by conversation or otherwise, in answering the questions given him.

Members of the Board should give the applicants general explanations only, and these should be limited to methods of procedure.

After an examination, all the papers should be taken charge of by the secretary of the Board.

Members of local boards are cautioned against furnishing information to any person in relation to the examinations, except in the general way prescribed in the rules.

All unused examination papers are to be returned to the commissioners the day after the examination.

As soon as practicable after completing the marking and grading of the papers, the secretary of the Board will send a certificate to each person who was examined, if he passed the examination, stating the standing which he obtained, as shown by the marking. He will also send notice to each applicant who failed to pass the examination, informing him of the fact.

In the general regulations adopted by the commissioners will be found information as to marking and grading, and the enrolment in the proper register of the names of those found eligible for appointment.

The chief examiner will be present at the examination whenever it is practicable to do so.

More specific rules for marking the examination papers will be issued hereafter.

Necessary expenses incurred by members of the Board for stationery, postage and actual travel, will be allowed by the commissioners.

HENRY SHERWIN,
Chief Examiner.

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APPLICATION OF THE CIVIL SERVICE RULES TO FIREMEN IN CITIES OUTSIDE OF BOSTON.

As it appears that there is not a clear understanding in regard to the effect of the civil service rule classifying the fire services of the cities of the Commonwealth, the following statement is made for the information of call firemen: —

First. — That this classification (Schedule B, Class 9), including "all members of the regular or permanent and any call member of the fire force of any city, except Boston," is made with the approval of the Governor and Council, under sections 6, 7 and 8 of chapter 19 of the Revised Laws. Under this classification the regular or permanent men, and also the call men, are included within the classified service. The call substitute or any person below the grade of call man is not classified.

Second. — The rule classifying the fire force went into operation July 1, 1905. The effect of this rule is that all persons in the service as permanent or call men on that date have the protection which all classified civil service employees have under the civil service rules, and especially under chapter 314 of the Acts of 1904, as amended, applying to removals and discharges.

Third. — Appointments to the permanent force or to the call force can hereafter be made only in the following manner (except where otherwise provided by special statute): —

Competitive examinations will be held in each city for the position of fireman, and an eligible list established of those passing the examination. In case of a vacancy occurring after July 1, 1905, in either the permanent force or in the call force, requisition must be made upon the Civil Service Commission, and three names will be certified from the list, in accordance with the rules. If the vacancy to be filled is in the call force, the man certified and appointed retains his position on the eligible list, and remains eligible for certification and appointment, without further examination, to the permanent force in case of a vacancy occurring therein, provided, however, that his position on the list is high enough at the time of such vacancy to entitle him to certification,

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and provided that the list has not terminated by the expiration of the two years' eligibility limit.

A man who was in the call force prior to July 1, 1905, cannot be appointed to the permanent force until he shall have passed a regular competitive examination for fireman; but inasmuch as the commissioners mark applicants on past experience and on knowledge of duties, and give thereto a heavy weight, the call man who has had experience in fire work and knowledge of his duties necessarily will have a very great advantage in the examination over applicants who have never served in the force.

Fourth. — Promotions in the different grades of the permanent fire force will be by competitive or non-competitive examination, in accordance with the request of the appointing officer.

Fifth. — Under the classification, applicants for appointment to either the permanent or call fire force must be not less than twenty-two nor over thirty-five years of age at the time of making application; except that a call man who shall apply for the permanent force may deduct from his actual age any time, not exceeding ten years, during which he has continuously served as call man.

In other words, a call man who is just under forty-five years of age, and who has continuously served as a call man for the ten years next preceding the date of filing his application, is entitled to apply for examination for the regular or permanent force.

By order of the Board of Civil Service Commissioners.

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INSTRUCTIONS TO APPLICANTS AND ELIGIBLES.

A person desiring to be examined for a position in the classified service should file an application on the prescribed blank, and a form for that purpose can be obtained at the office of the commissioners, room 152, State House, Boston, or of the secretary of the local board of examiners in the city where he lives.

Applications for the service of the Commonwealth and of the city of Boston should be filed in the commissioners' office, Boston; if for service in any city other than Boston they should be filed with the secretary of the board of civil service examiners in such city.

Applications will be received at any time, and notice of the time and place of examination will be seasonably sent to each applicant. If unable to attend the first examination after applying, the applicant will, upon satisfactory explanation, be notified to attend the next examination.

Non-competitive examinations are not given when it is practicable to establish an eligible list by competition, and they are never held at the request of an applicant.

The commissioners cannot furnish information as to the course of preparation which applicants should follow (except as shown by the specimen examination papers printed in their report), nor can they answer inquiries in relation to cases which are not before them for decision, or decide, except in the cases of actual applicants, questions respecting the application of the rules. Particular answers cannot be given to inquiries which are answered herein, directly or by implication.

Notice will be sent by mail to each examined applicant of the result of his examination as soon after the examination as it is practicable to do so.

The names of persons who have passed the required examination will remain on the eligible list two years from the date of their certificate, unless dropped therefrom after certification three times, or removed from said list for cause.

Applicants for clerical service whose names have been placed on the eligible list in Class 2 of Schedule A may also, *upon request in*

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writing, have their names placed on the eligible list for positions in Class 1 of Schedule A, with the same standing.

Applicants for clerical service in the departments of the Commonwealth whose names have been placed on the eligible list may, *upon request in writing*, have their papers marked by the local board of examiners of the city in which they reside, and their names placed on the eligible list for service in the departments of such city, and *vice versa*.

Persons whose names have been placed on the eligible list in Class 1 of Schedule B (prison service), and who have been certified for appointment, will be subjected to a physical examination if the appointing officer so requests.

The relative standing of any applicant as compared with that of others on the same eligible list may be changed by the addition of names of persons who have obtained higher standing at some more recent examination, and the time of the examination is not considered in making certifications.

Eligibles are certified in the order of their grade, and nothing can help and nothing can hinder their certification for appointment in the order of eligibility as prescribed by the civil service rules.

The commissioners are unable to answer inquiries as to vacancies in the service, salaries, prospects of certification, appointment or promotion. They know nothing of vacancies until requested to certify names for filling them, and it can only be generally said that the highest mark possible is 100, the lowest which gives eligibility is 65, and that the nearer the applicant's mark is to 100 the more likely it is that his name will be reached for certification. It is wholly uncertain, therefore, when an applicant's name may be reached for certification, and it is useless to speculate on what his chances may be.

Applicants will save the commissioners and themselves time and trouble by carefully reading the foregoing and preserving it for reference.

WARREN P. DUDLEY,
Secretary.

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SCHEDULE OF EXAMINATIONS.

In giving notice of the competitive examinations to be held in the cities and towns, and at the times mentioned in the following schedule, the commissioners reserve the right to order such additional or other examinations as the public service may require, or to change the time of any examination upon reasonable notice.

No applicant shall have the right to examination unless the application is filed, under the rules, at least one week before the examination: *provided*, that the commissioners or the chief examiner, for cause shown, may allow a person making an application at a later time to take the examination.

WARREN P. DUDLEY,
Secretary.

SCHEDULE OF EXAMINATIONS, BY DATES.

1906.

Jan. 1. Commonwealth, civil engineers, schedule B, class 12.
1. Boston, civil engineers, schedule B, class 12.
2. Commonwealth, civil engineers, schedule B, class 12.
2. Boston, civil engineers, schedule B, class 12.
3. Commonwealth, civil engineers, schedule B, class 12.
3. Boston, civil engineers, schedule B, class 12.
4. Commonwealth, civil engineers, schedule B, class 12.
4. Boston, civil engineers, schedule B, class 12.
5. Commonwealth, civil engineers, schedule B, class 12.
5. Boston, civil engineers, schedule B, class 12.
6. Milton, police, schedule B, class 3.
6. Milton, fire, schedule B, class 9.
8. Lawrence, police, schedule B, class 3.
8. Lawrence, foremen of laborers, inspectors of work, schedule B, class 6.
8. Lawrence, engineers and janitors of public buildings, schedule B, class 8.
8. Lawrence, fire, schedule B, class 9.
9. Commonwealth, foremen of laborers, inspectors of work, schedule B, class 6.

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1906.

Jan. 9. Boston, foremen of laborers, inspectors of work, schedule B, class 6.

10. Commonwealth, sub-foremen, schedule B, class 7.

10. Boston, sub-foremen, schedule B, class 7.

15. Boston, draw tenders, schedule B, class 5.

16. Chelsea, clerks, messengers, schedule A, classes 1 and 2.

16. Chelsea, police, schedule B, class 3.

16. Chelsea, foremen of laborers, inspectors of work, schedule B, class 6.

16. Chelsea, engineers and janitors of public buildings, schedule B, class 8.

16. Chelsea, fire, schedule B, class 9.

16. Cambridge, foremen of laborers, inspectors of work, schedule B, class 6.

17. Somerville, foremen of laborers, inspectors of work, schedule B, class 6.

17. Somerville, engineers and janitors of public buildings, schedule B, class 8.

19. Lawrence, clerks, messengers, schedule A, classes 1 and 2.

22. Waltham, clerks, messengers, schedule A, classes 1 and 2.

22. Waltham, foremen of laborers, inspectors of work, schedule B, class 6.

22. Waltham, engineers and janitors of public buildings, schedule B, class 8.

22. Waltham, fire, schedule B, class 9.

25. Revere, police, schedule B, class 3.

25. Revere, fire, schedule B, class 9.

25. Hyde Park, police, schedule B, class 3.

29. Salem, police, schedule B, class 3.

29. Salem, foremen of laborers, inspectors of work, schedule B, class 6.

29. Salem, engineers and janitors of public buildings, schedule B, class 8.

29. Salem, fire, schedule B, class 9.

31. Salem, clerks, messengers, schedule A, classes 1 and 2.

Feb. 7. Beverly, foremen of laborers, inspectors of work, schedule B, class 6.

7. Beverly, engineers and janitors of public buildings, schedule B, class 8.

7. Beverly, fire, schedule B, class 9.

9. Holyoke, clerks, messengers, schedule A, classes 1 and 2.

9. Holyoke, foremen of laborers, inspectors of work, schedule B, class 6.

10. Holyoke, police, schedule B, class 3.

10. Holyoke, engineers and janitors of public buildings, schedule B, class 8.

10. Holyoke, fire, schedule B, class 9.

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1906.

Feb. 12. Fitchburg, police, schedule B, class 3.
12. Fitchburg, fire, schedule B, class 9.
13. Fitchburg, foremen of laborers, inspectors of work, schedule B, class 6.
13. Fitchburg, engineers and janitors of public buildings, schedule B, class 8.
15. Brockton, clerks, messengers, schedule A, classes 1 and 2.
15. Brockton, foremen of laborers, inspectors of work, schedule B, class 6.
16. Brockton, engineers and janitors of public buildings, schedule B, class 8.
16. Brockton, fire, schedule B, class 9.
19. Somerville, clerks, messengers, schedule A, classes 1 and 2.
20. Somerville, police, schedule B, class 3.
23. Brookline, police, schedule B, class 3.
23. Brookline, foremen of laborers, inspectors of work, schedule B, class 6.
23. Brookline, engineers and janitors of public buildings, schedule B, class 8.
23. Brookline, fire, schedule B, class 9.
26. Marlborough, clerks, messengers, schedule A, classes 1 and 2.
26. Marlborough, police, schedule B, class 3.
26. Marlborough, foremen of laborers, inspectors of work, schedule B, class 6.
26. Marlborough, engineers and janitors of public buildings, schedule B, class 8.
26. Marlborough, fire, schedule B, class 9.
27. Commonwealth, metropolitan park police, schedule B, class 1.
28. Commonwealth, prison service, schedule B, class 1.
28. Boston, prison service, schedule B, class 1.

Mar. 1. Lowell, clerks, messengers, schedule A, class 1.
2. Lowell, clerks, messengers, schedule A, class 2.
5. Lowell, foremen of laborers, inspectors of work, schedule B, class 6.
5. Lowell, engineers and janitors of public buildings, schedule B, class 8.
5. Lowell, fire, schedule B, class 9.
7. Malden, police, schedule B, class 3.
7. Malden, foremen of laborers, inspectors of work, schedule B, class 6.
8. Malden, engineers and janitors of public buildings, schedule B, class 8.
8. Malden, fire, schedule B, class 9.
9. Springfield, clerks, messengers, schedule A, classes 1 and 2.
9. Springfield, foremen of laborers, inspectors of work, schedule B, class 6.
12. Brookline, clerks, messengers, schedule A, classes 1 and 2.

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1906.

Mar. 14. Medford, police, schedule B, class 3.
14. Medford, foremen of laborers, inspectors of work, schedule B, class 6.
14. Medford, engineers and janitors of public buildings, schedule B, class 8.
14. Medford, fire, schedule B, class 9.
15. Medford, clerks, messengers, schedule A, classes 1 and 2.
16. Boston, engineers and janitors of public buildings, schedule B, class 8.
19. Commonwealth, civil engineers, schedule B, class 12.
19. Boston, civil engineers, schedule B, class 12.
20. Commonwealth, civil engineers, schedule B, class 12.
20. Boston, civil engineers, schedule B, class 12.
21. Commonwealth, civil engineers, schedule B, class 12.
21. Boston, civil engineers, schedule B, class 12.
22. Commonwealth, civil engineers, schedule B, class 12.
22. Boston, civil engineers, schedule B, class 12.
23. Commonwealth, civil engineers, schedule B, class 12.
23. Boston, civil engineers, schedule B, class 12.
26. Boston, fire, schedule B, class 2.
27. Boston, police, schedule B, class 4.
30. Cambridge, police, schedule B, class 3.
30. Cambridge, fire, schedule B, class 9.

Apr. 2. Lowell, police, schedule B, class 3.
4. Fall River, police, schedule B, class 3.
5. Fall River, fire, schedule B, class 9.
6. Fall River, foremen of laborers, inspectors of work, schedule B, class 6.
6. Fall River, engineers and janitors of public buildings, schedule B, class 8.
9. Boston, clerks, messengers, schedule A, class 1.
10. Commonwealth, clerks, messengers, schedule A, class 1.
11. Commonwealth, clerks, messengers, schedule A, class 2.
12. Boston, clerks, messengers, schedule A, class 2.
16. Boston, stenographer-typewriters, schedule A, class 4.
17. Commonwealth, stenographer-typewriters, schedule A, class 4.
20. Chicopee, clerks, messengers, schedule A, classes 1 and 2.
20. Chicopee, foremen of laborers, inspectors of work, schedule B, class 6.
20. Chicopee, engineers and janitors of public buildings, schedule B, class 8.
20. Chicopee, fire, schedule B, class 9.
23. Quincy, clerks, messengers, schedule A, classes 1 and 2.
24. Quincy, police, schedule B, class 3.
24. Quincy, foremen of laborers, inspectors of work, schedule B, class 6.

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1906.

Apr. 24. Quincy, engineers and janitors of public buildings, schedule B, class 8.
24. Quincy, fire, schedule B, class 9.
26. Cambridge, clerks, messengers, schedule A, classes 1 and 2.
30. Newton, police, schedule B, class 3.
30. Newton, foremen of laborers, inspectors of work, schedule B, class 6.
30. Newton, engineers and janitors of public buildings, schedule B, class 8.

May 1. Newton, clerks, messengers, schedule A, classes 1 and 2.
1. Newton, fire, schedule B, class 9.
2. Commonwealth, foremen of laborers, inspectors of work, schedule B, class 6.
2. Boston, foremen of laborers, inspectors of work, schedule B, class 6.
3. Commonwealth, sub-foremen, schedule B, class 7.
3. Boston, sub-foremen, schedule B, class 7.
4. Melrose, clerks, messengers, schedule A, classes 1 and 2.
4. Melrose, police, schedule B, class 3.
4. Melrose, foremen of laborers, inspectors of work, schedule B, class 6.
5. Melrose, engineers and janitors of public buildings, schedule B, class 8.
5. Melrose, fire, schedule B, class 9.
7. Pittsfield, clerks, messengers, schedule A, classes 1 and 2.
7. Pittsfield, police, schedule B, class 3.
7. Pittsfield, foremen of laborers, inspectors of work, schedule B, class 6.
8. Pittsfield, engineers and janitors of public buildings, schedule B, class 8.
8. Pittsfield, fire, schedule B, class 9.
10. Brockton, police, schedule B, class 3.
14. New Bedford, police, schedule B, class 3.
14. New Bedford, foremen of laborers, inspectors of work, schedule B, class 6.
15. New Bedford, engineers and janitors of public buildings, schedule B, class 8.
15. New Bedford, fire, schedule B, class 9.
17. Springfield, police, schedule B, class 3.
18. Springfield, engineers and janitors of public buildings, schedule B, class 8.
18. Springfield, fire, schedule B, class 9.
21. Haverhill, police, schedule B, class 3.
21. Haverhill, foremen of laborers, inspectors of work, schedule B, class 6.

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1906.

May 21. Haverhill, engineers and janitors of public buildings, schedule B, class 8.
21. Haverhill, fire, schedule B, class 9.
23. Fitchburg, clerks, messengers, schedule A, classes 1 and 2.
25. Haverhill, clerks, messengers, schedule A, classes 1 and 2.

June 4. Cambridge, draw tenders, schedule B, class 5.
4. Cambridge, engineers and janitors of public buildings, schedule B, class 8.
6. North Adams, clerks, messengers, schedule A, classes 1 and 2.
6. North Adams, police, schedule B, class 3.
6. North Adams, foremen of laborers, inspectors of work, schedule B, class 6.
6. North Adams, engineers and janitors of public buildings, schedule B, class 8.
6. North Adams, fire, schedule B, class 9.

Sept. 17. Boston, fire, schedule B, class 2.
18. Boston, police, schedule B, class 4.
24. Boston, clerks, messengers, schedule A, class 1.
25. Commonwealth, clerks, messengers, schedule A, class 1.
27. Commonwealth, clerks, messengers, schedule A, class 2.
28. Boston, clerks, messengers, schedule A, class 2.

Oct. 1. Boston, stenographer-typewriters, schedule A, class 4.
2. Commonwealth, stenographer-typewriters, schedule A, class 4.
5. Worcester, police, schedule B, class 3.
8. Fall River, clerks, messengers, schedule A, classes 1 and 2.
10. Everett, clerks, messengers, schedule A, classes 1 and 2.
10. Everett, police, schedule B, class 3.
10. Everett, foremen of laborers, inspectors of work, schedule B, class 6.
10. Everett, engineers and janitors of public buildings, schedule B, class 8.
10. Everett, fire, schedule B, class 9.
15. New Bedford, clerks, messengers, schedule A, classes 1 and 2.
19. Malden, clerks, messengers, schedule A, classes 1 and 2.
22. Newburyport, clerks, messengers, schedule A, classes 1 and 2.
22. Newburyport, police, schedule B, class 3.
22. Newburyport, foremen of laborers, inspectors of work, schedule B, class 6.
23. Newburyport, engineers and janitors of public buildings, schedule B, class 8.
23. Newburyport, fire, schedule B, class 9.
25. Chicopee, police, schedule B, class 3.

Nov. 1. Lynn, clerks, messengers, schedule A, classes 1 and 2.

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1906.

Nov. 5. Gloucester, police, schedule B, class 3.
5. Gloucester, foremen of laborers, inspectors of work, schedule B, class 6.
5. Gloucester, fire, schedule B, class 9.
7. Gloucester, clerks, messengers, schedule A, classes 1 and 2.
7. Gloucester, engineers and janitors of public buildings, schedule B, class 8.
8. Woburn, clerks, messengers, schedule A, classes 1 and 2.
8. Woburn, fire, schedule B, class 9.
9. Woburn, police, schedule B, class 3.
9. Woburn, foremen of laborers, inspectors of work, schedule B, class 6.
9. Woburn, engineers and janitors of public buildings, schedule B, class 8.
12. Waltham, police, schedule B, class 3.
13. Worcester, fire, schedule B, class 9.
15. Lynn, police, schedule B, class 3.
15. Lynn, foremen of laborers, inspectors of work, schedule B, class 6.
15. Lynn, engineers and janitors of public buildings, schedule B, class 8.
15. Lynn, fire, schedule B, class 9.
19. Northampton, clerks, messengers, schedule A, classes 1 and 2.
19. Northampton, police, schedule B, class 3.
19. Northampton, foremen of laborers, inspectors of work, schedule B, class 6.
19. Northampton, engineers and janitors of public buildings, schedule B, class 8.
19. Northampton, fire, schedule B, class 9.
22. Beverly, police, schedule B, class 3.
23. Beverly, clerks, messengers, schedule A, classes 1 and 2.
26. Somerville, fire, schedule B, class 9.

Dec. 3. Taunton, police, schedule B, class 3.
3. Taunton, foremen of laborers, inspectors of work, schedule B, class 6.
3. Taunton, fire, schedule B, class 9.
5. Taunton, clerks, messengers, schedule A, classes 1 and 2.
5. Taunton, engineers and janitors of public buildings, schedule B, class 8.
13. Worcester, clerks, messengers, schedule A, classes 1 and 2.
14. Worcester, foremen of laborers, inspectors of work, schedule B, class 6.
14. Worcester, engineers and janitors of public buildings, schedule B, class 8.
31. Commonwealth, civil engineers, schedule B, class 12.
31. Boston, civil engineers, schedule B, class 12.

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1907.

Jan. 1. Commonwealth, civil engineers, schedule B, class 12.
1. Boston, civil engineers, schedule B, class 12.
2. Commonwealth, civil engineers, schedule B, class 12.
2. Boston, civil engineers, schedule B, class 12.
3. Commonwealth, civil engineers, schedule B, class 12.
3. Boston, civil engineers, schedule B, class 12.
4. Commonwealth, civil engineers, schedule B, class 12.
4. Boston, civil engineers, schedule B, class 12.
5. Milton, police, schedule B, class 3.
5. Milton, fire, schedule B, class 9.
7. Lawrence, police, schedule B, class 3.
7. Lawrence, foremen of laborers, inspectors of work, schedule B, class 6.
7. Lawrence, engineers and janitors of public buildings, schedule B, class 8.
7. Lawrence, fire, schedule B, class 9.
8. Commonwealth, foremen of laborers, inspectors of work, schedule B, class 6.
8. Boston, foremen of laborers, inspectors of work, schedule B, class 6.
9. Commonwealth, sub-foremen, schedule B, class 7.
9. Boston, sub-foremen, schedule B, class 7.
14. Boston, draw tenders, schedule B, class 5.
15. Chelsea, clerks, messengers, schedule A, classes 1 and 2.
15. Chelsea, police, schedule B, class 3.
15. Chelsea, foremen of laborers, inspectors of work, schedule B, class 6.
15. Chelsea, engineers and janitors of public buildings, schedule B, class 8.
15. Chelsea, fire, schedule B, class 9.
15. Cambridge, foremen of laborers, inspectors of work, schedule B, class 6.
16. Somerville, foremen of laborers, inspectors of work, schedule B, class 6.
16. Somerville, engineers and janitors of public buildings, schedule B, class 8.
18. Lawrence, clerks, messengers, schedule A, classes 1 and 2.
21. Waltham, clerks, messengers, schedule A, classes 1 and 2.
21. Waltham, foremen of laborers, inspectors of work, schedule B, class 6.
21. Waltham, engineers and janitors of public buildings, schedule B, class 8.
21. Waltham, fire, schedule B, class 9.
24. Revere, police, schedule B, class 3.
24. Revere, fire, schedule B, class 9.
24. Hyde Park, police, schedule B, class 3.

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1907.

Jan. 28. Salem, police, schedule B, class 3.
28. Salem, foremen of laborers, inspectors of work, schedule B, class 6.
28. Salem, engineers and janitors of public buildings, schedule B, class 8.
28. Salem, fire, schedule B, class 9.
30. Salem, clerks, messengers, schedule A, classes 1 and 2.

Feb. 6. Beverly, foremen of laborers, inspectors of work, schedule B, class 6.
6. Beverly, engineers and janitors of public buildings, schedule B, class 8.
6. Beverly, fire, schedule B, class 9.
8. Holyoke, clerks, messengers, schedule A, classes 1 and 2.
8. Holyoke, foremen of laborers, inspectors of work, schedule B, class 6.
9. Holyoke, police, schedule B, class 3.
9. Holyoke, engineers and janitors of public buildings, schedule B, class 8.
9. Holyoke, fire, schedule B, class 9.
11. Fitchburg, police, schedule B, class 3.
11. Fitchburg, fire, schedule B, class 9.
12. Fitchburg, foremen of laborers, inspectors of work, schedule B, class 6.
12. Fitchburg, engineers and janitors of public buildings, schedule B, class 8.
14. Brockton, clerks, messengers, schedule A, classes 1 and 2.
14. Brockton, foremen of laborers, inspectors of work, schedule B, class 6.
15. Brockton, engineers and janitors of public buildings, schedule B, class 8.
15. Brockton, fire, schedule B, class 9.
18. Somerville, clerks, messengers, schedule A, classes 1 and 2.
19. Somerville, police, schedule B, class 3.
21. Brookline, police, schedule B, class 3.
21. Brookline, foremen of laborers, inspectors of work, schedule B, class 6.
21. Brookline, engineers and janitors of public buildings, schedule B, class 8.
21. Brookline, fire, schedule B, class 9.
25. Marlborough, clerks, messengers, schedule A, classes 1 and 2.
25. Marlborough, police, schedule B, class 3.
25. Marlborough, foremen of laborers, inspectors of work, schedule B, class 6.
25. Marlborough, engineers and janitors of public buildings, schedule B, class 8.

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1907.

Feb. 25. Marlborough, fire, schedule B, class 9.
26. Commonwealth, metropolitan park police, schedule B, class 1.
27. Commonwealth, prison service, schedule B, class 1.
27. Boston, prison service, schedule B, class 1.
28. Lowell, clerks, messengers, schedule A, class 1.

Mar. 1. Lowell, clerks, messengers, schedule A, class 2.
4. Lowell, foremen of laborers, inspectors of work, schedule B, class 6.
4. Lowell, engineers and janitors of public buildings, schedule B, class 8.
4. Lowell, fire, schedule B, class 9.
6. Malden, police, schedule B, class 3.
6. Malden, foremen of laborers, inspectors of work, schedule B, class 6.
7. Malden, engineers and janitors of public buildings, schedule B, class 8.
7. Malden, fire, schedule B, class 9.
8. Springfield, clerks, messengers, schedule A, classes 1 and 2.
8. Springfield, foremen of laborers, inspectors of work, schedule B, class 6.
11. Brookline, clerks, messengers, schedule A, classes 1 and 2.
13. Medford, police, schedule B, class 3.
13. Medford, foremen of laborers, inspectors of work, schedule B, class 6.
13. Medford, engineers and janitors of public buildings, schedule B, class 8.
13. Medford, fire, schedule B, class 9.
14. Medford, clerks, messengers, schedule A, classes 1 and 2.
15. Boston, engineers and janitors of public buildings, schedule B, class 8.
18. Commonwealth, civil engineers, schedule B, class 12.
18. Boston, civil engineers, schedule B, class 12.
19. Commonwealth, civil engineers, schedule B, class 12.
19. Boston, civil engineers, schedule B, class 12.
20. Commonwealth, civil engineers, schedule B, class 12.
20. Boston, civil engineers, schedule B, class 12.
21. Commonwealth, civil engineers, schedule B, class 12.
21. Boston, civil engineers, schedule B, class 12.
22. Commonwealth, civil engineers, schedule B, class 12.
22. Boston, civil engineers, schedule B, class 12.
25. Boston, fire, schedule B, class 2.
26. Boston, police, schedule B, class 4.
29. Cambridge, police, schedule B, class 3.
29. Cambridge, fire, schedule B, class 9.

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SCHEDULE OF EXAMINATIONS FOR THE SERVICE OF THE COMMONWEALTH AND THE SEVERAL CITIES.

Commonwealth.

1906.

Jan. 1. Civil engineers, schedule B, class 12.
2. Civil engineers, schedule B, class 12.
3. Civil engineers, schedule B, class 12.
4. Civil engineers, schedule B, class 12.
5. Civil engineers, schedule B, class 12.
9. Foremen of laborers, inspectors of work, schedule B, class 6.
10. Sub-foremen, schedule B, class 7.

Feb. 27. Metropolitan park police, schedule B, class 1.
28. Prison service, schedule B, class 1.

Mar. 19. Civil engineers, schedule B, class 12.
20. Civil engineers, schedule B, class 12.
21. Civil engineers, schedule B, class 12.
22. Civil engineers, schedule B, class 12.
23. Civil engineers, schedule B, class 12.

Apr. 10. Clerks, messengers, schedule A, class 1.
11. Clerks, messengers, schedule A, class 2.
17. Stenographer-typewriters, schedule A, class 4.

May 2. Foremen of laborers, inspectors of work, schedule B, class 6.
3. Sub-foremen, schedule B, class 7.

Sept. 25. Clerks, messengers, schedule A, class 1.
27. Clerks, messengers, schedule A, class 2.

Oct. 2. Stenographer-typewriters, schedule A, class 4.

Dec. 31. Civil engineers, schedule B, class 12.

1907.

Jan. 1. Civil engineers, schedule B, class 12.
2. Civil engineers, schedule B, class 12.
3. Civil engineers, schedule B, class 12.
4. Civil engineers, schedule B, class 12.
8. Foremen of laborers, inspectors of work, schedule B, class 6.
9. Sub-foremen, schedule B, class 7.

Feb. 26. Metropolitan park police, schedule B, class 1.
27. Prison service, schedule B, class 1.

Mar. 18. Civil engineers, schedule B, class 12.
19. Civil engineers, schedule B, class 12.
20. Civil engineers, schedule B, class 12.
21. Civil engineers, schedule B, class 12.
22. Civil engineers, schedule B, class 12.

Boston.

1906.

Jan. 1. Civil engineers, schedule B, class 12.
2. Civil engineers, schedule B, class 12.
3. Civil engineers, schedule B, class 12.

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1906.

Jan. 4. Civil engineers, schedule B, class 12.
5. Civil engineers, schedule B, class 12.
9. Foremen of laborers, inspectors of work, schedule B, class 6.
10. Sub-foremen, schedule B, class 7.
15. Draw tenders, schedule B, class 5.
Feb. 28. Prison service, schedule B, class 1.
Mar. 16. Engineers and janitors of public buildings, schedule B, class 8.
19. Civil engineers, schedule B, class 12.
20. Civil engineers, schedule B, class 12.
21. Civil engineers, schedule B, class 12.
22. Civil engineers, schedule B, class 12.
23. Civil engineers, schedule B, class 12.
26. Fire, schedule B, class 2.
27. Police, schedule B, class 4.
Apr. 9. Clerks, messengers, schedule A, class 1.
12. Clerks, messengers, schedule A, class 2.
16. Stenographer-typewriters, schedule A, class 4.
May 2. Foremen of laborers, inspectors of work, schedule B, class 6.
3. Sub-foremen, schedule B, class 7.
Sept. 17. Fire, schedule B, class 2.
18. Police, schedule B, class 4.
24. Clerks, messengers, schedule A, class 1.
28. Clerks, messengers, schedule A, class 2.
Oct. 1. Stenographer-typewriters, schedule A, class 4.
Dec. 31. Civil engineers, schedule B, class 12.

1907.

Jan. 1. Civil engineers, schedule B, class 12.
2. Civil engineers, schedule B, class 12.
3. Civil engineers, schedule B, class 12.
4. Civil engineers, schedule B, class 12.
8. Foremen of laborers, inspectors of work, schedule B, class 6.
9. Sub-foremen, schedule B, class 7.
14. Draw tenders, schedule B, class 5.
Feb. 27. Prison service, schedule B, class 1.
Mar. 15. Engineers and janitors of public buildings, schedule B, class 8.
25. Fire, schedule B, class 2.
26. Police, schedule B, class 4.

Beverly.

1906.

Feb. 7. Foremen of laborers, inspectors of work, schedule B, class 6.
7. Engineers and janitors of public buildings, schedule B, class 8.
7. Fire, schedule B, class 9.

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1906.
Nov. 22. Police, schedule B, class 3.
23. Clerks, messengers, schedule A, classes 1 and 2.
1907.
Feb. 6. Foremen of laborers, inspectors of work, schedule B, class 6.
6. Engineers and janitors of public buildings, schedule B, class 8.
6. Fire, schedule B, class 9.

Brockton.

1906.
Feb. 15. Clerks, messengers, schedule A, classes 1 and 2.
15. Foremen of laborers, inspectors of work, schedule B, class 6.
16. Engineers and janitors of public buildings, schedule B, class 8.
16. Fire, schedule B, class 9.
May 10. Police, schedule B, class 3.
1907.
Feb. 14. Clerks, messengers, schedule A, classes 1 and 2.
14. Foremen of laborers, inspectors of work, schedule B, class 6.
15. Engineers and janitors of public buildings, schedule B, class 8.
15. Fire, schedule B, class 9.

Brookline.

1906.
Feb. 23. Police, schedule B, class 3.
23. Foremen of laborers, inspectors of work, schedule B, class 6.
23. Engineers and janitors of public buildings, schedule B, class 8.
23. Fire, schedule B, class 9.
Mar. 12. Clerks, messengers, schedule A, classes 1 and 2.
1907.
Feb. 21. Police, schedule B, class 3.
21. Foremen of laborers, inspectors of work, schedule B, class 6.
21. Engineers and janitors of public buildings, schedule B, class 8.
21. Fire, schedule B, class 9.
Mar. 11. Clerks, messengers, schedule A, classes 1 and 2.

Cambridge.

1906.
Jan. 16. Foremen of laborers, inspectors of work, schedule B, class 6.
Mar. 30. Police, schedule B, class 3.
30. Fire, schedule B, class 9.
Apr. 26. Clerks, messengers, schedule A, classes 1 and 2.
June 4. Draw tenders, schedule B, class 5.
4. Engineers and janitors of public buildings, schedule B, class 8.
1907.
Jan. 15. Foremen of laborers, inspectors of work, schedule B, class 6.
Mar. 29. Police, schedule B, class 3.
29. Fire, schedule B, class 9.

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Chelsea.

1906.

Jan. 16. Clerks, messengers, schedule A, classes 1 and 2.
16. Police, schedule B, class 3.
16. Foremen of laborers, inspectors of work, schedule B, class 6.
16. Engineers and janitors of public buildings, schedule B, class 8.
16. Fire, schedule B, class 9.

1907.

Jan. 15. Clerks, messengers, schedule A, classes 1 and 2.
15. Police, schedule B, class 3.
15. Foremen of laborers, inspectors of work, schedule B, class 6.
15. Engineers and janitors of public buildings, schedule B, class 8.
15. Fire, schedule B, class 9.

Chicopee.

1906.

Apr. 20. Clerks, messengers, schedule A, classes 1 and 2.
20. Foremen of laborers, inspectors of work, schedule B, class 6.
20. Engineers and janitors of public buildings, schedule B, class 8.
20. Fire, schedule B, class 9.
Oct. 25. Police, schedule B, class 3.

Everett.

1906.

Oct. 10. Clerks, messengers, schedule A, classes 1 and 2.
10. Police, schedule B, class 3.
10. Foremen of laborers, inspectors of work, schedule B, class 6.
10. Engineers and janitors of public buildings, schedule B, class 8.
10. Fire, schedule B, class 9.

Fall River.

1906.

Apr. 4. Police, schedule B, class 3.
5. Fire, schedule B, class 9.
6. Foremen of laborers, inspectors of work, schedule B, class 6.
6. Engineers and janitors of public buildings, schedule B, class 8.
Oct. 8. Clerks, messengers, schedule A, classes 1 and 2.

Fitchburg.

1906.

Feb. 12. Police, schedule B, class 3.
12. Fire, schedule B, class 9.
13. Foremen of laborers, inspectors of work, schedule B, class 6.
13. Engineers and janitors of public buildings, schedule B, class 8.
May 23. Clerks, messengers, schedule A, classes 1 and 2.

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1907.
Feb. 11. Police, schedule B, class 3.
11. Fire, schedule B, class 9.
12. Foremen of laborers, inspectors of work, schedule B, class 6.
12. Engineers and janitors of public buildings, schedule B, class 8.

Gloucester.

1906.
Nov. 5. Police, schedule B, class 3.
5. Foremen of laborers, inspectors of work, schedule B, class 6.
5. Fire, schedule B, class 9.
7. Clerks, messengers, schedule A, classes 1 and 2.
7. Engineers and janitors of public buildings, schedule B, class 8.

Haverhill.

1906.
May 21. Police, schedule B, class 3.
21. Foremen of laborers, inspectors of work, schedule B, class 6.
21. Engineers and janitors of public buildings, schedule B, class 8.
21. Fire, schedule B, class 9.
25. Clerks, messengers, schedule A, classes 1 and 2.

Holyoke.

1906.
Feb. 9. Clerks, messengers, schedule A, classes 1 and 2.
9. Foremen of laborers, inspectors of work, schedule B, class 6.
10. Police, schedule B, class 3.
10. Engineers and janitors of public buildings, schedule B, class 8.
10. Fire, schedule B, class 9.

1907.
Feb. 8. Clerks, messengers, schedule A, classes 1 and 2.
8. Foremen of laborers, inspectors of work, schedule B, class 6.
9. Police, schedule B, class 3.
9. Engineers and janitors of public buildings, schedule B, class 8.
9. Fire, schedule B, class 9.

Hyde Park.

1906.
Jan. 25. Police, schedule B, class 3.

1907.
Jan. 24. Police, schedule B, class 3.

Lawrence.

1906.
Jan. 8. Police, schedule B, class 3.
8. Foremen of laborers, inspectors of work, schedule B, class 6.
8. Engineers and janitors of public buildings, schedule B, class 8.

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1906.
Jan. 8. Fire, schedule B, class 9.
19. Clerks, messengers, schedule A, classes 1 and 2.
1907.
Jan. 7. Police, schedule B, class 3.
7. Foremen of laborers, inspectors of work, schedule B, class 6.
7. Engineers and janitors of public buildings, schedule B, class 8.
7. Fire, schedule B, class 9.
18. Clerks, messengers, schedule A, classes 1 and 2.

Lowell.

1906.
Mar. 1. Clerks, messengers, schedule A, class 1.
2. Clerks, messengers, schedule A, class 2.
5. Foremen of laborers, inspectors of work, schedule B, class 6.
5. Engineers and janitors of public buildings, schedule B, class 8.
5. Fire, schedule B, class 9.
Apr. 2. Police, schedule B, class 3.
1907.
Feb. 28. Clerks, messengers, schedule A, class 1.
Mar. 1. Clerks, messengers, schedule A, class 2.
4. Foremen of laborers, inspectors of work, schedule B, class 6.
4. Engineers and janitors of public buildings, schedule B, class 8.
4. Fire, schedule B, class 9.

Lynn.

1906.
Nov. 1. Clerks, messengers, schedule A, classes 1 and 2.
15. Police, schedule B, class 3.
15. Foremen of laborers, inspectors of work, schedule B, class 6.
15. Engineers and janitors of public buildings, schedule B, class 8.
15. Fire, schedule B, class 9.

Malden.

1906.
Mar. 7. Police, schedule B, class 3.
7. Foremen of laborers, inspectors of work, schedule B, class 6.
8. Engineers and janitors of public buildings, schedule B, class 8.
8. Fire, schedule B, class 9.
Oct. 19. Clerks, messengers, schedule A, classes 1 and 2.
1907.
Mar. 6. Police, schedule B, class 3.
6. Foremen of laborers, inspectors of work, schedule B, class 6.
7. Engineers and janitors of public buildings, schedule B, class 8.
7. Fire, schedule B, class 9.

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Marlborough.

1906.
Feb. 26. Clerks, messengers, schedule A, classes 1 and 2.
26. Police, schedule B, class 3.
26. Foremen of laborers, inspectors of work, schedule B, class 6.
26. Engineers and janitors of public buildings, schedule B, class 8.
26. Fire, schedule B, class 9.

1907.
Feb. 25. Clerks, messengers, schedule A, classes 1 and 2.
25. Police, schedule B, class 3.
25. Foremen of laborers, inspectors of work, schedule B, class 6.
25. Engineers and janitors of public buildings, schedule B, class 8.
25. Fire, schedule B, class 9.

Medford.

1906.
Mar. 14. Police, schedule B, class 3.
14. Foremen of laborers, inspectors of work, schedule B, class 6.
14. Engineers and janitors of public buildings, schedule B, class 8.
14. Fire, schedule B, class 9.
15. Clerks, messengers, schedule A, classes 1 and 2.

1907.
Mar. 13. Police, schedule B, class 3.
13. Foremen of laborers, inspectors of work, schedule B, class 6.
13. Engineers and janitors of public buildings, schedule B, class 8.
13. Fire, schedule B, class 9.
14. Clerks, messengers, schedule A, classes 1 and 2.

Melrose.

1906.
May 4. Clerks, messengers, schedule A, classes 1 and 2.
4. Police, schedule B, class 3.
4. Foremen of laborers, inspectors of work, schedule B, class 6.
5. Engineers and janitors of public buildings, schedule B, class 8.
5. Fire, schedule B, class 9.

Milton.

1906.
Jan. 6. Police, schedule B, class 3.
6. Fire, schedule B, class 9.

1907.
Jan. 5. Police, schedule B, class 3.
5. Fire, schedule B, class 9.

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New Bedford.

1906.
May 14. Police, schedule B, class 3.
14. Foremen of laborers, inspectors of work, schedule B, class 6.
15. Engineers and janitors of public buildings, schedule B, class 8.
15. Fire, schedule B, class 9.
Oct. 15. Clerks, messengers, schedule A, classes 1 and 2.

Newburyport.

1906.
Oct. 22. Clerks, messengers, schedule A, classes 1 and 2.
22. Police, schedule B, class 3.
22. Foremen of laborers, inspectors of work, schedule B, class 6.
23. Engineers and janitors of public buildings, schedule B, class 8.
23. Fire, schedule B, class 9.

Newton.

1906.
Apr. 30. Police, schedule B, class 3.
30. Foremen of laborers, inspectors of work, schedule B, class 6.
30. Engineers and janitors of public buildings, schedule B, class 8.
May 1. Clerks, messengers, schedule A, classes 1 and 2.
1. Fire, schedule B, class 9.

North Adams.

1906.
June 6. Clerks, messengers, schedule A, classes 1 and 2.
6. Police, schedule B, class 3.
6. Foremen of laborers, inspectors of work, schedule B, class 6.
6. Engineers and janitors of public buildings, schedule B, class 8.
6. Fire, schedule B, class 9.

Northampton.

1906.
Nov. 19. Clerks, messengers, schedule A, classes 1 and 2.
19. Police, schedule B, class 3.
19. Foremen of laborers, inspectors of work, schedule B, class 6.
19. Engineers and janitors of public buildings, schedule B, class 8.
19. Fire, schedule B, class 9.

Pittsfield.

1906.
May 7. Clerks, messengers, schedule A, classes 1 and 2.
7. Police, schedule B, class 3.
7. Foremen of laborers, inspectors of work, schedule B, class 6.
8. Engineers and janitors of public buildings, schedule B, class 8.
8. Fire, schedule B, class 9.

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Quincy.

1906.
Apr. 23. Clerks, messengers, schedule A, classes 1 and 2.
24. Police, schedule B, class 3.
24. Foremen of laborers, inspectors of work, schedule B, class 6.
24. Engineers and janitors of public buildings, schedule B, class 8.
24. Fire, schedule B, class 9.

Revere.

1906.
Jan. 25. Police, schedule B, class 3.
25. Fire, schedule B, class 9.
1907.
Jan. 24. Police, schedule B, class 3.
24. Fire, schedule B, class 9.

Salem.

1906.
Jan. 29. Police, schedule B, class 3.
29. Foremen of laborers, inspectors of work, schedule B, class 6.
29. Engineers and janitors of public buildings, schedule B, class 8.
29. Fire, schedule B, class 9.
31. Clerks, messengers, schedule A, classes 1 and 2.
1907.
Jan. 28. Police, schedule B, class 3.
28. Foremen of laborers, inspectors of work, schedule B, class 6.
28. Engineers and janitors of public buildings, schedule B, class 8.
28. Fire, schedule B, class 9.
30. Clerks, messengers, schedule A, classes 1 and 2.

Somerville.

1906.
Jan. 17. Foremen of laborers, inspectors of work, schedule B, class 6.
17. Engineers and janitors of public buildings, schedule B, class 8.
Feb. 19. Clerks, messengers, schedule A, classes 1 and 2.
20. Police, schedule B, class 3.
Nov. 26. Fire, schedule B, class 9.
1907.
Jan. 16. Foremen of laborers, inspectors of work, schedule B, class 6.
16. Engineers and janitors of public buildings, schedule B, class 8.
Feb. 18. Clerks, messengers, schedule A, classes 1 and 2.
19. Police, schedule B, class 3.

Springfield.

1906.
Mar. 9. Clerks, messengers, schedule A, classes 1 and 2.
9. Foremen of laborers, inspectors of work, schedule B, class 6.
May 17. Police, schedule B, class 3.
18. Engineers and janitors of public buildings, schedule B, class 8.
18. Fire, schedule B, class 9.

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1907.
Mar. 8. Clerks, messengers, schedule A, classes 1 and 2.
8. Foremen of laborers, inspectors of work, schedule B, class 6.

Taunton.

1906.
Dec. 3. Police, schedule B, class 3.
3. Foremen of laborers, inspectors of work, schedule B, class 6.
3. Fire, schedule B, class 9.
5. Clerks, messengers, schedule A, classes 1 and 2.
5. Engineers and janitors of public buildings, schedule B, class 8.

Waltham.

1906.
Jan. 22. Clerks, messengers, schedule A, classes 1 and 2.
22. Foremen of laborers, inspectors of work, schedule B, class 6.
22. Engineers and janitors of public buildings, schedule B, class 8.
22. Fire, schedule B, class 9.
Nov. 12. Police, schedule B, class 3.
1907.
Jan. 21. Clerks, messengers, schedule A, classes 1 and 2.
21. Foremen of laborers, inspectors of work, schedule B, class 6.
21. Engineers and janitors of public buildings, schedule B, class 8.
21. Fire, schedule B, class 9.

Woburn.

1906.
Nov. 8. Clerks, messengers, schedule A, classes 1 and 2.
8. Fire, schedule B, class 9.
9. Police, schedule B, class 3.
9. Foremen of laborers, inspectors of work, schedule B, class 6.
9. Engineers and janitors of public buildings, schedule B, class 8.

Worcester.

1906.
Oct. 5. Police, schedule B, class 3.
Nov. 13. Fire, schedule B, class 9.
Dec. 13. Clerks, messengers, schedule A, classes 1 and 2.
14. Foremen of laborers, inspectors of work, schedule B, class 6.
14. Engineers and janitors of public buildings, schedule B, class 8.

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EXAMINATION PAPERS.

SCHEDULE A — CLASS 1.*

[Limited Examination.]

Clerical Service.

First Subject:

Writing from dictation.

One of the examiners will read, so distinctly that each person being examined can hear him, one of the exercises for dictation. In general, not more than twenty words per minute will be read, nor more than five or six words without pause. After the reading, five minutes will be allowed for punctuation.

[*To Applicant.* Write as much as you can of the passage read. If from any cause you miss a word, do not pause, but go on with the next words you hear. *Write clearly; spell and punctuate correctly. Use no abbreviations.*]

Spelling. Usually twenty words, announced by the examiner.

Rough draft. Making a fair transcription of the rough draft of a letter or report, writing out all abbreviations in full, and inserting the added or corrected parts in their proper places. *No changes in punctuation or capitals are to be made.*

Handwriting; shown in copying rough draft.

Second Subject:

1. Write in figures the following number: —
   One hundred two million thirteen thousand five.
   Write in words the number expressed by the following figures: — 20,010,003$\frac{4}{5}\frac{2}{3}$
2. Add these *across*, placing the total in the space indicated; then add the totals: —

						Totals.
16,385	8,534	19,653	30,016	29,868	14,464	
14,627	17,437	18,438	3,741	22,972	18,988	
13,206	67,433	34,965	12,674	32,905	3,276	
16,389	27,865	32,476	18,430	33,301	18,655	
15,826	18,866	24,069	18,865	13,796	24,397	

* To become eligible, applicants who take the limited examination must obtain sixty-five per cent. in each subject.

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3. What is the sum of $\frac{3}{4}$, $\frac{5}{8}$, $2\frac{1}{2}$ and $3\frac{3}{16}$? *Give the work in full*, using the lowest common denominator. Give the answer in mixed numbers.

   If a foot rule should be shortened $2\frac{1}{2}$ inches at one end and $\frac{3}{8}$ of an inch at the other, what would be the length of the remainder? *Give the work in full.*

4. Divide three-sixteenths by two-fifths, and change the result to a decimal. *Give the work in full.*

   To four thousand one hundred five millionths add two and fifteen thousandths. *Give the work in full.*

5. Multiply .0025 by 1.0017. *Give the work in full.*

   Divide one hundred by three and one hundred twenty-five thousandths. *Give the work in full.*

6. What will be the cost of carpeting a room 14 feet long, 12 feet wide, with carpet 1 yard wide, worth $1.25 per yard, with 10 cents per yard added for putting down? *Give the work in full.*

7. If $13\frac{1}{4}$ yards of cloth cost $39.75, how many yards can be bought for $279.25? *Give the work in full.*

8. If $\frac{2}{3}$ of a man's money is $200 less than $\frac{5}{7}$ of it, how much has he? *Give the work in full.*

9. A house which cost $5,000 rents for $25 a month, and the owner pays 2 per cent. on $\frac{2}{3}$ of its value in taxes and $25 a year for repairs; what per cent. does the house pay? *Give the work in full.*

10. A piece of property pays a tax of $129.01, which is at the rate of $13.30 per thousand dollars. What is the value of the property? *Give the work in full.*

Third Subject:

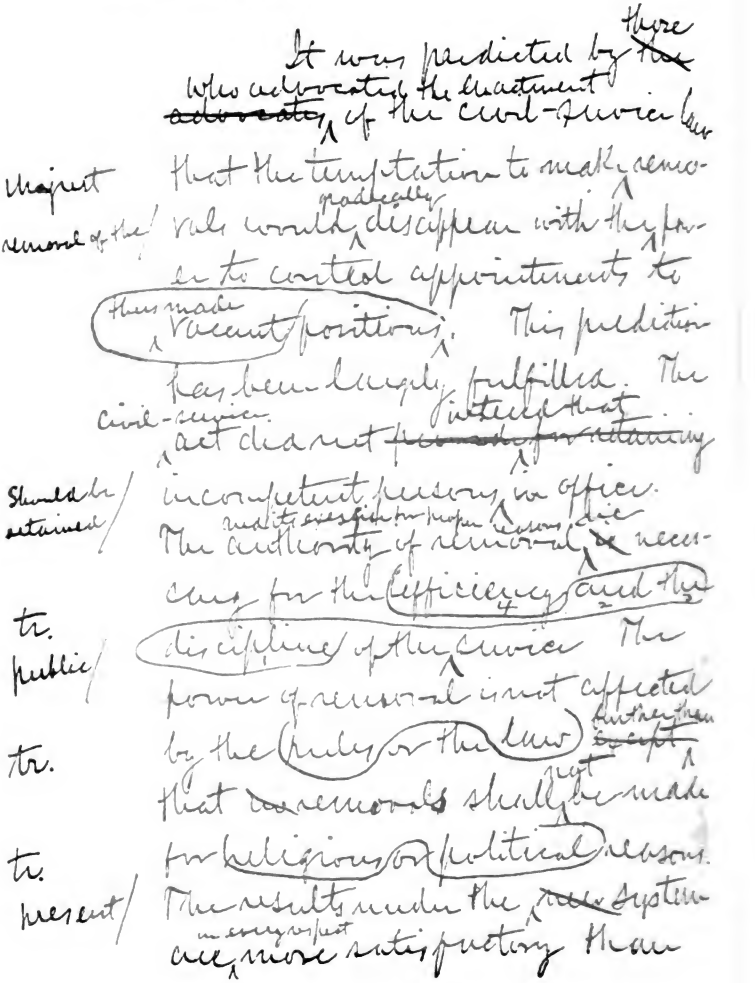
Writing a letter on some subject given at the examination.

[This exercise is designed chiefly to test the applicant's skill in English composition, knowledge of the use of punctuation marks and capitals, paragraphing, etc.]

The letter should be signed with the applicant's number, not his name.

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Specimen "rough draft" referred to in examination papers of clerks and messengers.



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old/ under the ~~other~~ system.
in the early/ There are restrictions in regard
persons/ to the reinstatement of ~~those~~
who have been dismissed for
delinquencies or misconduct,
while inefficient employees,
under the old system & persons
who should have been discharged
in office for delinquencies or misconduct but only kept in office without
regard to their findings, but
dismissed/ when some of them were ~~discharged~~
for proper reasons, they often had sufficient
political or other/ influence to get back into
the service. Such reinstatements cannot now be made under
civil service/ the ~~present~~ rules

UNIV. OF MICH.

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SCHEDULE A — CLASS 2.*

[General Examination.]

Clerical Service.

First Subject:

Writing from dictation.

One of the examiners will read, so distinctly that each person being examined can hear, one of the exercises for dictation. In general, not more than twenty words per minute will be read, nor more than five or six words without pause. After the reading, five minutes will be allowed for reviewing the work.

[*To Applicant.* Write as much as you can of the passage read. If from any cause you miss a word, do not pause, but go on with the next words you hear. *Write clearly; spell and punctuate correctly. Use no abbreviations.*]

Spelling. Usually twenty words, announced by the examiner.

Rough draft. Making a fair copy of the rough draft of a letter or report, writing out all abbreviations in full, and inserting the added or corrected parts in their proper places. *No changes in punctuation or capitals are to be made.*

Handwriting; shown in copying rough draft.

Second Subject:

1. Write in figures the following number: —

   Forty million two thousand fifteen and twenty-seven sixty-seconds.

   Write in words the number expressed by the following figures: — 101,000,002.03

2. Add these *across*, placing the total in the space indicated; then add the totals: —

						Totals.
39,276	75,498	29,286	32,766	80,055	22,334	
18,463	42,863	8,375	126,582	18,689	79,868	
36,594	29,988	19,499	23,776	35,601	9,596	
63,002	75,542	66,352	19,240	3,743	32,478	
22,382	213,748	13,868	37,439	34,897	74,950	

* To become eligible, applicants who take the general examination must obtain sixty-five per cent. in each of the first three subjects.

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3. What number must be added to the sum of $\frac{1}{4}$, $\frac{7}{8}$ and $1\frac{1}{2}$ to make $5\frac{89}{120}$? *Give the work in full*, using the lowest common denominator. Give the answer in mixed numbers. How many times is $5\frac{1}{3}$ contained in 164? *Give the work in full.*
4. Add eleven ten-thousandths, nine and six millionths, four and twenty-nine hundred-millionths, three hundred fifteen and thirty-seven hundredths, and subtract $17\frac{7}{16}$. *Give the work in full.*
5. A trader bought cows, sheep and horses, 70 in all. There were three times as many horses as cows, and twice as many sheep as horses. How many were there of each? *Give the work in full.*
6. What is the cost of $100\frac{2}{5}$ yards of cloth, if $125\frac{1}{2}$ yards cost $263.75? *Give the work in full.*
7. If six-tenths of a cord of wood cost three-fourths as much as a ton of coal, how many tons of coal are equal in value to $5\frac{1}{4}$ cords of wood? *Give the work in full.*
8. If $9\frac{1}{2}$ acres of land produce $256\frac{1}{2}$ bushels of wheat, how many acres will it require to produce 1,500 bushels? *Give the work in full.*
9. A house rents for $60 a month; the taxes and expenses are $108 a year, and the owner realizes 6 per cent. clear profit a year on the money he paid for the house. What did he pay for it? *Give the work in full.*
10. By selling a horse for $125.32 I make a profit of 4 per cent. If I had sold him for $118.09, what per cent. should I have lost on the cost? *Give the work in full.*

Third Subject:

1. Find the interest on $920 for 9 months and 23 days, at the rate of 6 per cent. a year. *Give the work in full.*
2. Find the interest on $280 from Aug. 15, 1891, to Feb. 4, 1892, at 7 per cent. per annum. *Give the work in full.*
3. At compound interest, what will $300 amount to in 2 years and 3 months, at 4 per cent., interest compounded annually. *Give the work in full.*
4. If a note for $560.50, dated June 10, at 6 months, is discounted at a bank August 3, the rate being 6 per cent. a year, what will be the proceeds? *Give the work in full.*
5. If $270 is the interest on $3,000 for 18 months, what is the rate per annum? *Give the work in full.*

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Fourth Subject:

Writing a letter on some subject given at the examination.

[This exercise is designed chiefly to test the applicant's skill in English composition, knowledge of the use of punctuation marks and capitals, paragraphing, etc.]

The letter should be signed with the applicant's number, not his name.

SCHEDULE A — CLASS 3.

Inspector: Water Department.

First Subject:

State how long you have resided in this city and what your trade or occupation has been since you began to earn your living.

If you have learned a trade, state where and under whom you learned it and how long you worked at it.

If you have had any practical experience in the duties of the office for which you apply, or of any similar office, state when, where, for how long and under whom you had it.

State also any experience you may have obtained in business life or in the superintendence of others, either in public or private business.

If you are familiar with any foreign language, state what language it is.

Write not less than ten lines. Do not sign your name.

[On this the applicant is marked for clearness and correctness of statement, and for experience.]

Second Subject:

1. Write in figures the following number: —
   One hundred eleven thousand three hundred six.
   Write in words the number expressed by the following figures: — 49,852
2. Add the following column of figures: — 27,896
   35,427
   12,397
   75,556
   29,872
   12,387

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3. An army of 10,000 men lost 4,809 men in battle; how many men were left? *Give the work in full.*
4. How much will 72 barrels of flour weigh, if each barrel weighs 196 pounds? *Give the work in full.*
5. How many horses worth $125 apiece must be given for a farm worth $11,000? *Give the work in full.*
6. What will be the cost of 32 pounds of coffee at 28⅜ cents a pound? *Give the work in full.*

Third Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

Fourth Subject:

Questions to test the applicant's knowledge of the water service, causes of waste, etc.

Fifth Subject:

Reading a water meter.

SCHEDULE A — CLASS 3.

Inspector: Health Department.

First, second and third subjects: — Letter-writing, spelling, handwriting, arithmetic.

Fourth Subject:

Questions relating to the duties of health inspector; contagious diseases; fumigation and purification; ventilation, disinfectants, etc.

SCHEDULE A — CLASS 3.

Almoner, Agent, Inspector, Visitor: Department of Overseers of the Poor.

First Subject:

Writing from dictation.
Spelling.

Second Subject:

Letter-writing.
Experience.

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Third Subject:

1. Write in figures the following amount: —
   Four thousand six dollars and nine cents.
   Write in words the number expressed by the following figures: — 60,010
2. Add the following column: —

   $287.46
   1,349.82
   2,386.95
   689.73
   1,055.28
   964.13

3. If the salaries of 2,010 teachers amount to $1,055,752.50, what is the average salary of each? *Give the work in full.*
4. A farmer bought 25 cows at $37.75 apiece, and a number of others at $25 apiece; how many cows in the second lot, if the whole cost was $4,668.75? *Give the work in full.*
5. A merchant sold 182½ pounds of sugar, 12¾ pounds of cheese and 37⅛ pounds of tea; how many pounds did he sell in all? *Give the work in full.*

Fourth Subject:

Handwriting: shown by copying printed matter.

Special Subject:

Questions relating to the settlement and pauper laws.

SCHEDULE A — CLASS 4.

Stenographer-Typewriter.

First Subject:

Copying printed matter, thus showing handwriting and accuracy in copying. Spelling: twenty words announced by the examiner.

Second Subject:

1. Write in figures the following number: —
   One hundred three million four thousand two and thirty-one seventy-fifths.
   Write in words the number expressed by the following figures: — 9,001,010.0012

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2. Add these *across*, placing the totals in the space indicated; then add the totals: —

						Totals.
42,753	36,840	17,865	9,476	327,685	35,782	
36,415	32,264	74,322	3,482	22,690	24,969	
34,820	21,140	8,742	227,865	46,650	3,764	

3. What is the sum of $\frac{2}{3}\frac{3}{4}$, $\frac{5}{7}$, $\frac{5}{8}$, and $1\frac{3}{21}$? *Give the work in full*, using the lowest common denominator. *The answer must be in a mixed number.*
4. What is the cost of $19\frac{3}{7}$ tons of coal at $\$5\frac{3}{8}$ a ton? *Give the work in full. Use common fractions.*
5. To fifteen and fifty-three thousandths add six and forty-six ten-thousandths, divide the amount by three-hundredths and subtract three hundred fifty and five-eighths. *Give the work in full. Use decimals.*
6. What fraction multiplied by $3\frac{1}{2}$ equals $\frac{5\frac{1}{6}}{\frac{2}{3}}$? *Give the work in full.*
7. How many cubic yards of stone are contained in a wall 214 feet 4 inches long, 9 feet high and 3 feet 4 inches thick? *Give the work in full.*
8. If a pole $10\frac{1}{2}$ feet high casts a shadow $6\frac{1}{2}$ feet long, what is the height of a house which casts a shadow 39 feet long at the same hour? *Give the work in full.*
9. By selling a house for $\$8,437.50$, I make a profit of $12\frac{1}{2}$ per cent.; what was the cost? *Give the work in full.*
10. If a man sells a horse for $\$220$, he gains 10 per cent.; what per cent. will he gain or lose if he sells it for 10 per cent. less than $\$220$? *Give the work in full.*

Special Subject:

Short-hand writing and type-writing. Three tests of skill and accuracy in taking short-hand notes are given, one at the rate of 100 words, one at the rate of 120 and one at the rate of 150 words a minute. These notes are then transcribed by the use of the type-writing machine.

Type-writing printed matter, showing accuracy, speed, and technique.

Transcribing rough draft of a report, making corrected copy of a rough, unpunctuated letter, and tabulating.

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SCHEDULE A — CLASSES 1 AND 2.

Messengers.

For positions as messengers, where the annual pay is at the rate of $800 or less, the same examination as for Schedule A, class 1.

For positions as messengers, where the annual pay is at the rate of more than $800, the same examination as for Schedule A, class 2.

SCHEDULE B — CLASS 1.

Prison Service.

First Subject:

Writing from memory the substance of matter orally communicated.

Second Subject:

The answers to the questions on this sheet will be marked as a whole under two heads, — EXPERIENCE, and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

1. State in general terms your occupation since you became of age, and any experience you may possess which will be of use, if you should receive an appointment in the prison service.
2. If you have ever served in the prison department in any capacity, or in any public office, state when, where, how long, whether you were ever discharged for cause, or requested to resign; and whether, while in office, you were ever complained of for violation of the rules of the office, or for any conduct unbecoming an officer; and, if such complaint was made, what action was taken thereon.
3. Have you ever been convicted of any offence against the laws of this or any other State or nation?
4. Have you ever been a dealer in intoxicating liquors, or a bar-tender? If so, when, where and for how long?
5. Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

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6. Have you served in the army or navy of the United States, either in time of peace or war; and, if so, how long did you serve, and in what capacity, and did you receive an honorable discharge therefrom?
7. If you have ever served in the volunteer militia, name the regiment and company, and state how long and in what capacity you served, and whether you have been honorably discharged, been dismissed, have resigned or been asked to resign.
8. Have you ever had the handling of men, either in public office or private employment?

Third Subject:

1. Write in figures the following numbers: —
   Two thousand seven hundred forty-two.
   Six hundred seventy dollars and three cents.
2. Write in words the numbers expressed by the following figures: — 3,742
   $693.51
3. Add the following column of figures: —

	375
	2,146
	1,989
	2,432
	867
	1,233

4. From 27,321 subtract 18,465. *Give the work in full.*
5. Divide 1,554 by 42. *Give the work in full.*
6. Multiply 305 by 46. *Give the work in full.*
7. If a man works twenty-six days at two dollars and twenty-five cents per day, how much money will he earn? *Give the work in full.*

Fourth Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

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PHYSICAL EXAMINATION.

SCHEDULE B — CLASS 1.

I, [Write your full name.] , hereby declare that the answers to the following questions relating to my personal and family health, history, habits, and antecedents, are true to the best of my knowledge and belief, and that I am the person described in the following record of examination.

The Applicant will fill out this portion of the blank.

What is your occupation?
Do you use tobacco? If so, in what manner, and how much do you use in a week?
Do you drink intoxicating liquors? If so, how frequently?
Have you any disease now?
What diseases have you had during the last seven years?
Do you know of any hereditary disease in your family?
If your parents, brothers, or sisters, or any of them are dead, of what disease did they die?
Have you ever had any fracture or dislocation?
Have you ever received any injury to the head or spine?
Are you subject to piles?
Have you been vaccinated?
Have you ever had rheumatism?

Certificate of Examining Surgeon.

* Circumference of chest after forced expiration, ; after full inspiration .	
Are there any indications of disease of the organs of respiration or their appendages?	
Are there any indications of disease of the heart or of the blood vessels?	
Is the sight good?	
Is the hearing good?	
Has the applicant varicose veins or varicocele?	
Has the applicant hernia?	
Is the applicant flat-footed or has he any other malformation or disease of the feet?	

* There should be a difference of two inches at least at forced expiration and on full inspiration.

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Has the applicant any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?	
* Does the applicant display any evidence of having or having had syphilis?	

* Syphilitic taint or obesity must be regarded as good cause for rejection.

The applicant must be at least 5 feet 7 inches in height, in bare feet, and weigh at least 135 pounds without clothing.

REMARKS.

I hereby certify that I have this day examined and find that he is, by actual test, feet inches in height, in bare feet, and weighs pounds without clothing, and that he is of a robust constitution, and, in my opinion, is physically qualified to perform the duties of a prison officer.

Physician.

190 .

SCHEDULE B — CLASS 1.

*Metropolitan Park Police.**

The same tests, educational, physical and in strength, as are applied to applicants for the police force of Boston, Schedule B, Class 4.

SCHEDULE B — CLASS 2.

Fire Department of Boston.

First Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

* Each applicant for metropolitan park police service will be examined upon definitions of crimes, descriptions of legal papers and the duties of police officers, and he is entitled to receive from the commissioners a pamphlet containing the necessary information, after filing his application.

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Second Subject:

The answers to the questions on this sheet will be marked as a whole under two heads, — EXPERIENCE, and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

Write a letter to the mayor of Boston, giving as complete an account as possible of your school experience; also of the various occupations in which you have been engaged since you began to earn your own living, the firm or corporation by whom employed and the length of time at each service.

Have you ever done fire duty in any capacity, or been employed in any public office? If so, state when, where, how long, whether you were ever discharged for cause, or requested to resign; and whether, while in office, you were ever complained of for violation of the rules of the office, or for any conduct unbecoming an officer; and, if such complaint was made, what action was taken thereon.

Have you ever had any experience which, in your opinion, particularly fits you for the fire service? If so, state the same fully.

When were you born? Give month, day and year.

Where were you born?

Have you ever served in the volunteer militia? If so, name the regiment and company, and state how long and in what capacity you served, and whether you have been honorably discharged, been dismissed, have resigned or been asked to resign.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, for whom and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

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In your opinion, what particular qualities should a good fireman possess?

Give your reasons for wishing to become a member of the fire force of Boston.

Third Subject:

1. Write in figures the following number: —
   Ten thousand sixteen dollars and three cents.
   Write in words the number expressed by the following figures: — 11,006.
2. Add the following column: — $2,743.14
   1,967.42
   3,742.87
   658.45
   1,592.18
   1,898.09
3. A man paid $2,750 for a farm, $125 for drainage and $87.75 for repairs; he then sold it for $3,150.50. What was his profit by the transaction? *Give the work in full.*
4. A five-dollar bill was given to pay for 16.4 pounds of cheese at $0.125 per pound. What change should the purchaser receive? *Give the work in full.*
5. How much coffee at 36 cents a pound can be bought for $39.72? *Give the work in full.*
6. What will 125 pounds of sugar cost at 6⅔ cents a pound? *Give the work in full.*

Fourth Subject:

* Questions relating to the duties of a fireman, as prescribed by the fire commissioner.

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* Each applicant for fire service will be examined upon the duties of the office for which he applies, and he is entitled to receive from the Civil Service Commissioners a pamphlet containing the necessary information, after filing his application.

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PHYSICAL EXAMINATION.

SCHEDULE B — CLASS 2.

I, [Write your full name.] , hereby declare that the answers to the following questions relating to my personal and family health, history, habits, and antecedents, are true to the best of my knowledge and belief, and that I am the person described in the following record of examination.

The Applicant will fill out this portion of the blank.

What is your occupation?
Do you use tobacco? If so, in what manner, and how much do you use in a week?
Do you drink intoxicating liquors? If so, how frequently?
Have you any disease now?
What diseases have you had during the last seven years?
Do you know of any hereditary disease in your family?
If your parents, brothers, or sisters, or any of them, are dead, of what disease did they die?
Have you ever had fits?
Have you ever had any fracture or dislocation?
Have you ever received any injury to the head or spine?
Are you subject to piles?
Have you been vaccinated?
Have you ever had rheumatism?

Certificate of Examining Surgeon.

Are there any indications of disease of the organs of respiration or their appendages?	
Are there any indications of disease of the heart or of the blood vessels?	
Is the sight good?	
Has the applicant sufficient teeth, in good condition?	
Is the hearing good?	
Are the functions of the brain and nervous system in a healthy state?	
Has the applicant varicose veins?	
Has the applicant hernia?	

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If the applicant has had any serious illness or injury, state expressly what effect, if any, is perceptible in the heart, lungs, kidneys or other abdominal organs, or the skin, eyes, ears, limbs, etc.	
Has the applicant any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?	
* Does the applicant display any evidence of having or having had syphilis?	

* Syphilitic taint or obesity must be regarded as good cause for rejection.

Remarks.

I hereby certify that I have this day carefully and thoroughly examined the above-named applicant, and find that he is sound in limb and body, is able-bodied, of robust constitution, has good eyesight and good hearing, and in my opinion is physically qualified to sustain the labors and exposures, and perform the duties of a fireman in the city of Boston, and that the above is a truthful record of the examination.

Physician.

190 .

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Examination in Strength.

Applicant for Fire Service.

[The applicant will answer the six following questions.]

1. What is your full name?
2. What is your present address?
3. Where were you born?
4. What is the date of your birth?
5. What is your father's full name? (Give name, whether living or dead.)
6. What is your mother's full name? (Give name, whether living or dead.)

IDENTIFICATION.

Weight. Height. Ft. In.

(The examiner will check an appropriate description of the applicant from the following list.)

Hair.

Color, { black, brown, auburn, blonde, streaked, gray,

Appearance, { thick, thin, straight, curly,

Forehead.

{ perpendicular, receding, bulging, broad, medium, narrow, low, high,

Eyes.

Color, { unpigmented, yellow, orange, chestnut, maroon in circle, " general, pure maroon,

Nose.

{ straight, concave, convex,

Base, { horizontal, depressed, elevated,

Size, { large, medium, small,

IDENTIFICATION — Con.

Mouth.

Lips, { thick, thin, upper, prominent, lower, " without border, with wide " angles, depressed, " elevated,

Chin.

{ straight, receding, projecting, square, oval.

EXAMINATION IN STRENGTH.

	Strength Tests.	Per Cent.	Weight.	Product
Strength of back,			5	
Strength of legs,			5	
Strength of upper arm, H.			5	
Strength of upper arm, R.			5	
Strength of fore arm, L.			1	
Pectorals,			3	
Traction pull,			3	
Dumb-bells,			5	
Abdominal muscles,			1	
Adductors,			5	
Ladder,			5	
Rope,			6	
Agility,				
Condition, { excellent, good, poor,			1	
			50	

Average per cent. in strength, .

Scars.

Face,

Hands,

Remarks.

I hereby certify that I have this day carefully and thoroughly examined the above-named applicant, and that the above is a truthful record of such examination.

Physical Examiner.

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SCHEDULE B — CLASS 3.

Police of Cities other than Boston.

First Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

Second Subject:

The answers to the questions on this sheet will be marked as a whole under two heads, — EXPERIENCE, and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

Write a letter to the mayor of the city, giving as complete an account as possible of your school experience; also of the occupations in which you have been engaged since you began to earn your own living, the firm or corporation by whom employed, and the length of time at each service.

Have you ever done police duty in any capacity, or been employed in any public office? If so, state when, where, how long, whether you were ever discharged for cause, or requested to resign; and whether, while in office, you were ever complained of for violation of the rules of the office, or for any conduct unbecoming an officer; and, if such complaint was made, what action was taken thereon.

Have you ever had any experience which, in your opinion, particularly fits you for the police service? If so, state the same fully.

When were you born? Give month, day and year.

Where were you born?

Have you ever served in the volunteer militia? If so, name the regiment and company, and state how long and in what capacity you served, and whether you have been honorably discharged, been dismissed, have resigned or been asked to resign.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

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Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, for whom and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

In your opinion, what particular qualities should a good policeman possess?

Give your reasons for wishing to become a member of the police force.

Third Subject:

1. Write in figures the following number: —
   Twenty thousand six hundred five.
   Write in words the number expressed by the following figures: — 6,010
2. Add the following column: —

$287.54
195.87
349.63
101.25
246.80
328.42

3. If a man's yearly income is $1,200, and he spends $20 a week, how much can he save in one year? *Give the work in full.*
4. How many hogs can be bought for $1,076.25, if each hog cost $5.25? *Give the work in full.*
5. What will 8⅔ pounds of tea cost at 66 cents a pound? *Give the work in full.*
6. How many quarts of milk, at 7 cents a quart, will pay for 35 pounds of sugar at 5 cents a pound? *Give the work in full.*

Fourth Subject:

* Questions relating to the duties of a police officer, definitions of crimes, descriptions of legal papers, statutory law, etc.

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* Each applicant for police service in any city will be examined upon definitions of crimes, descriptions of legal papers, and the duties of the office for which he applies, and he is entitled to receive from the Board of Examiners a pamphlet containing the necessary information, after filing his application.

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PHYSICAL EXAMINATION.

Schedule B — Class 3.

[The applicant will answer the six following questions.]

1. What is your full name?
2. What is your present address?
3. Where were you born?
4. What is the date of your birth?
5. What is your father's full name?
6. What is your mother's full name?

Certificate of Examining Physician.

1. Eyes. Is the sight good? Is the applicant color-blind? Reject if eyesight is below the following formula: $\frac{15}{20}$ vision with one eye and $\frac{15}{50}$ of the other; both eyes less than $\frac{15}{20}$.	
2. Ears. Is the hearing good? Reject for defective hearing.	
3. Teeth. Are the teeth insufficient or defective? Reject if the applicant has insufficient or defective teeth; provided, however, that if he furnishes within thirty days from such rejection a certificate from some reputable dentist that his teeth have been put in proper condition for mastication, his name will be placed on the eligible list.	
4. Lungs. Are there any indications of disease of the organs of respiration or their appendages? Reject if any are found.	
5. Heart. Are there any indications of disease of the heart or of the blood vessels? Reject if any are found.	
6. Spine. Is the spine crooked? Reject for crooked spine, either anterior or lateral.	
7. Hands. Has the applicant lost either or both of his thumbs or any of his fingers? Reject for loss of thumb or any part thereof. Reject for loss of forefinger of either hand or any part thereof above the distal joint. Reject for loss of distal phalanx of any two fingers.	
8. Feet. Is the applicant flat-footed, or has he any other malformation or disease of the feet, or has he lost any of his toes? Reject for malformation of a foot that would impair usefulness. Reject for flat feet or weak arch, such as would be liable to break down. Reject for bunions, if large and show evidence of inflammation. Reject for loss of big toe. Reject for loss of toe or toes other than big toe, if such loss interferes with walking.	
9. Hernia. Has the applicant hernia? Reject for either complete or incomplete.	
10. Varicose Veins. Has the applicant varicose veins? Reject if found.	

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11. OBESITY. Is the applicant obese? Reject for excessive weight over 200 lbs. when excess is due to fat, or for obesity whatever the weight. Reject if the applicant is extremely thin for his height.			
12. PHTHISIS, SCROFULA AND RHEUMATISM. Has the applicant any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula or rheumatism? Reject if found.			
13. SYPHILIS AND GONORRHEA. Does the applicant display any evidence of having or having had syphilis or gonorrhea? Reject if he displays any evidence of having or having had these diseases.			
14. HEIGHT AND WEIGHT. What is the height and weight of the applicant in bare feet and without clothing? Reject if he is under 5 ft. 7 in. in bare feet and 135 lbs. without clothing. NOTE.—If the applicant is to be examined in strength, the height and weight need not be taken.	feet.	inches.	lbs.

REMARKS.

I hereby certify that I have this day examined the above-named applicant, that the above is a truthful record of the examination, and that he is of robust constitution, and is , in my opinion, physically qualified to perform the duties of a policeman in the city of

, *City Physician.*

190 .

SCHEDULE B — CLASS 3.

District Police. — Inspection Department.

First Subject:

The answers to the questions on this sheet will be marked under two heads, — EXPERIENCE and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is your trade or occupation?

Where and under whom did you learn your trade or occupation?

At what kind of work are you now employed, who is your employer, and how long have you been so employed?

If you are not at work now, state where and by whom you were employed last, the kind of work, and why you left that work.

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Have you followed more than one trade or occupation? If so, state what trades or occupations you have followed other than the one you have already mentioned.

If there is anything else in your experience which may tend to show your fitness for the position of Inspector in the District Police Force, state the same fully.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

Second Subject:

Copying printed matter, thus showing handwriting and accuracy in copying.

Third Subject:

1. Write in figures the following number: —
   Fifteen million four thousand fifty-one.
   Write in words the number expressed by the following figures: — 6,201,504
2. Add the following column of figures: — 131,042
   275,634
   187,965
   98,325
   346,424
   764,326
3. Add together $2\frac{7}{15}$, $4\frac{5}{8}$, $3\frac{1}{4}$. *Give the work in full*, using the lowest common denominator. Give the answer in mixed numbers.
   Multiply $25\frac{2}{7}$ by $3\frac{1}{3}$. *Give the work in full.*
4. Add together 201.23, 36.5 and .693; divide the sum by 4, and subtract 18.59896 from the product. *Give the work in full.*
5. How many square yards are there in a plot of ground 165 feet long and 150 feet wide? *Give the work in full.*
6. How many cubic feet will there be in a tank 16 feet 3 inches long, 9 feet 6 inches wide and 6 feet deep? *Give the work in full.*

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Fourth Subject:

Questions on the following subjects: Ventilation, sanitary plumbing, guarding machinery, safety devices on elevators, modes of egress in case of fire, devices and appliances for extinguishing fire, employment of women and children.

SCHEDULE B — CLASS 3.

Detective Force of District Police.

First Subject:

Write a letter, addressed to the Civil Service Commissioners, stating in detail what has been your experience. If you have had any practical experience in the duties of the office for which you apply, or of any similar office, state when, where, for how long and under whom you had it. *Sign the letter with your number, not your name.*

Second Subject:

1. Write in figures the following number: —
   Fifteen thousand seven hundred one.
   Write in words the number expressed by the following figures: — 10,010
2. Add the following column of figures: — 26,954
   17,683
   10,857
   18,642
   25,395
   32,963
3. If a man should buy a lot of land for $20,000, and sell it for $18,775, how much would he lose by the transaction? *Give the work in full.*
4. If 35 hogs cost $394.45, what is the cost of each hog? *Give the work in full.*
5. When eggs cost 35 cents a dozen, what is the cost of 648 eggs? *Give the work in full.*
6. What will 45 pounds of sugar cost at 8½ cents a pound? *Give the work in full.*

Third Subject:

Copying printed matter, thus showing handwriting and accuracy in copying.

Fourth Subject:

Questions relating to crimes, criminal processes, legal papers and methods of procedure which officers must know about in the prosecution of criminal cases.

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PHYSICAL EXAMINATION.

SCHEDULE B — CLASS 3.

I, [Write your full name.] , hereby declare that the answers to the following questions relating to my personal and family health, history, habits, and antecedents, are true to the best of my knowledge and belief, and that I am the person described in the following record of examination.

The Applicant will fill out this portion of the blank.

What is your occupation?
Do you use tobacco? If so, in what manner, and how much do you use in a week?
Do you drink intoxicating liquors? If so, how frequently?
Have you any disease now?
What diseases have you had during the last seven years?
Do you know of any hereditary disease in your family?
If your parents, brothers, or sisters, or any of them are dead, of what disease did they die?
Have you ever had any fracture or dislocation?
Have you ever received any injury to the head or spine?
Are you subject to piles?
Have you been vaccinated?
Have you ever had rheumatism?

Certificate of Examining Surgeon.

* Circumference of chest after forced expiration, ; after full inspiration,	
Are there any indications of disease of the organs of respiration or their appendages?	
Are there any indications of disease of the heart or of the blood vessels?	
Is the sight good?	
Is the applicant color blind?	
Is the hearing good?	
Has the applicant varicose veins or varicocele?	
Has the applicant hernia?	
Is the applicant flat footed or has he any other malformation or disease of the feet?	
Has the applicant any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?	
† Does the applicant display any evidence of having or having had syphilis?	

* There should be a difference of two inches at least at forced expiration and on full inspiration.

† Syphilitic taint or obesity must be regarded as good cause for rejection.

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The applicant must be at least 5 feet 7 inches in height, in bare feet, and weigh at least 135 pounds, without clothing.

REMARKS.

I hereby certify that I have this day examined
and find that he is, by actual test, feet inches in height, in bare feet, and weighs pounds without clothing, and that he is of a robust constitution, and, in my opinion, is physically qualified to perform the duties of a district police officer.

Medical Examiner,
District.
190 . County.

SCHEDULE B — CLASS 4.

Police Force of Boston.

First Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

Second Subject:

The answers to the questions on this sheet will be marked as a whole under two heads, — EXPERIENCE and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

Write a letter to the mayor of Boston, giving as complete an account as possible of your school experience; also of the various occupations in which you have been engaged since you began to earn your own living, the firm or corporation by whom employed, and the length of time at each service.

Have you ever done police duty in any capacity, or been employed in any public office? If so, state when, where, how long, whether you were ever discharged for cause, or requested to resign; and whether, while in office, you were ever complained of for violation of the rules of the office, or for any conduct unbecoming an officer; and, if such complaint was made, what action was taken thereon.

Have you ever had any experience which, in your opinion, particularly fits you for the police service? If so, state the same fully.

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When were you born? Give month, day and year.

Where were you born?

Have you ever served in the volunteer militia? If so, name the regiment and company, and state how long and in what capacity you served, and whether you have been honorably discharged, been dismissed, have resigned or been asked to resign.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, for whom and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

In your opinion, what particular qualities should a good policeman possess?

Give your reasons for wishing to become a member of the police force of Boston.

Third Subject:

1. Write in figures the following amount: —
   Ten thousand five dollars and two cents.
   Write in words the number expressed by the following figures: — 9,002

2. Add the following column: —

$1,865.43
3,459.12
1,865.42
999.85
2,394.12
1,164.10

3. A man paid $4,162.50 for a farm, $137.50 for drainage and $250.75 for repairs; he then sold it for $4,850.50. What was his profit by the transaction? *Give the work in full.*

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4. A ten-dollar bill was given to pay for 18.4 pounds of coffee at $0.325 per pound. What change should the purchaser receive? *Give the work in full.*

5. How much coffee at 39 cents a pound can be bought for $27.56? *Give the work in full.*

6. What will 220 pounds of sugar cost at $7\frac{2}{5}$ cents a pound? *Give the work in full.*

Fourth Subject:

* Questions relating to the duties of a police officer, as prescribed by the Board of Police, definitions of crimes, descriptions of legal papers, statutory law, etc.

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* Each applicant for police service will be examined upon definitions of crimes, descriptions of legal papers, and the duties of the office for which he applies, and he is entitled to receive from the civil service commissioners a pamphlet containing the necessary information, after filing his application.

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PHYSICAL EXAMINATION.

SCHEDULE B — CLASS 4.

I, [Write your full name.] , hereby declare that the answers to the following questions relating to my personal and family health, history, habits, and antecedents, are true to the best of my knowledge and belief, and that I am the person described in the following record of examination.

The Applicant will fill out this portion of the blank.

What is your occupation?
Do you use tobacco? If so, in what manner, and how much do you use in a week?
Do you drink intoxicating liquors? If so, how frequently?
Have you any disease now?
What diseases have you had during the last seven years?
Do you know of any hereditary disease in your family?
If your parents, brothers, or sisters, or any of them, are dead, of what disease did they die?
Have you ever had fits?
Have you ever had any fracture or dislocation?
Have you ever received any injury to the head or spine?
Are you subject to piles?
Have you been vaccinated?
Have you ever had rheumatism?

Certificate of Examining Surgeon.

Are there any indications of disease of the organs of respiration or their appendages?	
Are there any indications of disease of the heart or of the blood vessels?	
Is the sight good?	
Is the applicant color blind?	
Is the hearing good?	
Are the functions of the brain and nervous system in a healthy state?	
Has the applicant varicose veins?	
Has the applicant hernia?	
Is the applicant flat-footed or has he any other malformation or disease of the feet?	

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If the applicant has had any serious illness or injury, state expressly what effect, if any, is perceptible in the heart, lungs, kidneys or other abdominal organs, or the skin, eyes, ears, limbs, etc.	
Has the applicant any predisposition, either hereditary or acquired, to any constitutional disease, as phthisis, scrofula, rheumatism?	
* Does the applicant display any evidence of having or having had syphilis?	

* Syphilitic taint or obesity must be regarded as good cause for rejection.

Remarks.

I hereby certify that I have this day carefully and thoroughly examined the above-named applicant, and find that he is sound in limb and body, is able-bodied, of robust constitution, has good eyesight and good hearing, and in my opinion is physically qualified to sustain the labors and exposures, and perform the duties of a policeman in the city of Boston, and that the above is a truthful record of the examination.

Physician.

190 .

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Examination in Strength.

Applicant for Police Service.

[The applicant will answer the six following questions.]

1. What is your full name?
2. What is your present address?
3. Where were you born?
4. What is the date of your birth?
5. What is your father's full name? (Give name, whether living or dead.)
6. What is your mother's full name? (Give name, whether living or dead.)

IDENTIFICATION.

Weight. Height. Ft. In.

(The examiner will check an appropriate description of the applicant from the following list.)

Hair.

Color: black, brown, auburn, blonde, streaked, gray,

Appearance: thick, thin, straight, curly,

Forehead.

perpendicular, receding, bulging, broad, medium, narrow, low, high,

Eyes.

Color: unpigmented, yellow, orange, chestnut, maroon in circle, " general, pure maroon,

Nose.

straight, concave, convex,

Base: horizontal, depressed, elevated,

Size: large, medium, small,

Scars.

Face,

Hands,

IDENTIFICATION—Con.

Mouth.

Lips: thick, thin, upper, prominent, lower, " without border, with wide " angles, depressed, " elevated,

Chin.

straight, receding, projecting, square, oval,

EXAMINATION IN STRENGTH.

	Strength Tests.	Per Cent.	Weight.	Product.
Strength of back,			4	
Strength of legs,			4	
Strength of upper arm, H. P.			4	
Strength of fore arm, R. L.			4	
Pectorals,			3	
Traction pull,			3	
Dumb-bells,			4	
Abdominal muscles,			3	
Adductors,			3	
Agility,			3	
Condition: excellent, good, poor,			1	
			50	
Average per cent. in strength,				

Remarks.

I hereby certify that I have this day carefully and thoroughly examined the above-named applicant, and that the above is a truthful record of such examination.

Physical Examiner.

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SCHEDULE B — CLASS 5.

Draw-tender of Bridges.

First Subject:

The answers to the questions on this sheet will be marked under the head EXPERIENCE. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is your trade or occupation?

Where and under whom did you learn your trade or occupation?

How long have you followed that trade or occupation?

At what kind of work are you now employed, who is your employer, and how long have you been so employed?

If you are not at work now, state where and by whom you were employed last, the kind of work, and why you left that work.

Have you followed more than one trade or occupation? If so, state what trades or occupations you have followed other than the one you have already mentioned.

Have you ever been a draw-tender or assistant draw-tender? If so, state when, where, for how long, and, if you have left the position, why you left it.

Have you ever had charge of men? If so, state fully how many, where, when, for how long and in what kind of work.

Have you had any other experience which, in your opinion, fits you for the position you seek? If so, state the same fully.

Can you pull and manage a row-boat?

Are you an expert swimmer, and can you furnish certificates of the same, signed by competent persons?

Do you hold a State license as an engineer? If so, what is the date of it?

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

What is the date of your birth?

Where were you born?

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Second Subject:

1. Write in figures the following: —
   One thousand five hundred and sixty-three dollars and fourteen cents.
2. Write in words the number expressed by the following figures: — 14,368
3. Add the following column of figures: — 1,792
   3,467
   1,823
   3,119
   427
   2,236
4. From 21,315 subtract 19,678. *Give the work in full.*
5. Divide 4,968 by 23. *Give the work in full.*
6. Multiply 726 by 54. *Give the work in full.*

Third Subject:

Questions relating to the duties which draw-tenders are called upon to perform.

SCHEDULE B — CLASS 6.

Foremen and Inspectors.

First Subject:

The answers to the questions on this sheet will be marked under the head EXPERIENCE. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is your trade or occupation?

Where and under whom did you learn your trade or occupation?

At what kind of work are you now employed, who is your employer, and how long have you been so employed?

If you are not at work now, state where, how long and by whom you were employed last, the kind of work, and why you left that work.

Have you followed more than one trade or occupation? If so, state what trades or occupations you have followed other than the one you have already mentioned, and how long you worked at each.

If there is anything else in your experience which may tend to show your fitness for the position you seek, state the same fully.

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Have you ever had charge of men? If so, state fully how many, where, when, for how long and in what kind of work.

Have you ever been foreman or sub-foreman in charge? If so, state when, where, how long and for whom you worked, and the kind of work.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

Second Subject:

1. Write in figures the following number: —
   One thousand five hundred sixty-three.
   Write in words the number expressed by the following figures: — 12,207
2. Add the following column of figures: — 1,743
   876
   1,427
   3,764
   998
   2,507
3. Suppose you have under you 36 men at $1.75 per day; a rain-storm prevents them from working the last half day. What will be the amount of their pay for that day? *Give the work in full.*
4. If you have a pile of 10,000 bricks, and take away 7,550 of them, how many will be left? *Give the work in full.*
5. When stone is worth 88 cents a yard, how many yards can be bought for $37.85? *Give the work in full.*

Third Subject:

Foremen and inspectors in the water department.

Questions on trench work, pipe-laying, measurements and materials.

Third Subject:

Foremen and inspectors in sewer department.

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Questions relating to the different kinds of sewers, the preparation and use of cement and other materials, and trench work.

Third Subject:

Foremen and inspectors in the department of streets, parks, cemeteries and public grounds.

Questions on street, road and sidewalk building, cart measurement, grade-stakes, etc.

Third Subject:

Foremen and inspectors in the street cleaning division.

Questions relating to cleaning streets.

Third Subject:

Foremen and inspectors in sanitary division.

Questions relating to the handling of ashes, offal, etc.

Fourth Subject:

Foremen and inspectors in all the departments except the street cleaning and sanitary departments.

Questions on ledge work, and the care and use of explosives.

Fourth Subject:

Foremen and inspectors in the street cleaning and sanitary divisions.

Questions relating to the handling and care of horses.

Fifth Subject:

Foremen and inspectors in the department of streets, parks, cemeteries and public grounds.

Questions on drainage.

Foremen and inspectors of masonry.

Questions relating to construction of brick and stone masonry.

SCHEDULE B — CLASS 7.

Sub-foreman of Laborers.

First Subject:

State your occupation during the past ten years, the names and residences, so far as you remember, of your employers during that period.

Have you ever been foreman or sub-foreman in charge? If so, state when, where, and under whom you worked, and the kind of work in which you were employed.

Have you ever had charge of men? If so, state fully how many, where, when, for how long and in what kind of work.

Have you ever done any ledge work, or had the handling or care of explosives? If so, state when, where and for how long.

[On these statements the applicant is marked for experience only.]

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Second Subject:

1. Write in figures the following: —
   One hundred and sixty-three dollars and twelve cents.
2. If you receive 23 loads of gravel one day, 34 loads the next, and 17 loads the next, how many loads will you then have in all? *Give the work in full.*
3. If you have $45 and pay out $27 for rent and other expenses, how much will you have left? *Give the work in full.*
4. If a cubic yard of stone costs 88 cents, how many yards can be bought for $39.60? *Give the work in full.*
5. What wages, at $1.75 per day, would be due a laborer, he having worked an entire week of six days, except one half day? *Give the work in full.*

Third Subject:

Questions relating to general work; the use of tools, reading grade-stakes, tallying, etc.

Fourth Subject: (Not obligatory.)

Questions on ledge work; the tools used, care and use of explosives, etc.

Fourth Subject:

Sub-foremen in street cleaning division.

Questions relating to the handling and care of horses.

SCHEDULE B — CLASS 6.

Building Inspectors.

First Subject:

The answers to the questions on this sheet will be marked under two heads, — EXPERIENCE, and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statements made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is your trade or occupation?

Where and under whom did you learn your trade or occupation?

At what kind of work are you now employed, who is your employer, and how long have you been so employed?

If you are not at work now, state where and by whom you were employed last, the kind of work, and why you left that work.

Did your present or last employer sign a recommendation for you upon your present application? If not, why not?

Have you followed more than one trade or occupation? If so, state what trades or occupations you have followed other than the one you have already mentioned.

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If there is anything else in your experience which may tend to show your fitness for the position of Building Inspector, state the same fully.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

Second Subject:

Copying printed matter, thus showing handwriting and accuracy in copying.

Third Subject:

Arithmetic.

Fourth Subject:

Questions relating to brick and stone masonry, carpentry and iron work.

Fifth Subject:

Knowledge of construction as shown by drawing plans to scale.

SCHEDULE B — CLASS 8.

Janitors, Engineers and Persons having Charge of School or Other Public Buildings, or of the Heating Apparatus thereof, in Any City.

First Subject:

The answers to the questions on this sheet will be marked under the head EXPERIENCE. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is your trade or occupation?

Where and under whom did you learn your trade or occupation?

At what kind of work are you now employed, who is your employer, and how long have you been so employed?

If you are not at work now, state where and by whom you were employed last, the kind of work, and why you left that work.

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Have you followed more than one trade or occupation? If so, state what trades or occupations you have followed other than the one you have already mentioned.

If there is anything else in your experience which may tend to show your fitness for the position you seek, state the same fully.

When were you born?

Where were you born?

Have you ever had the charge or care of any building, public or private? If so, state the kind of building, its size, where located, and how long you had the charge or care of it.

Have you had any experience in taking care of furnaces or heating apparatus? If so, state when and where, the kind of building heated, how long you were so employed, and what kind of heating apparatus was used.

Do you now hold a State license as an engineer or fireman? If so, give class and date of license.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

Second Subject:

Arithmetic: Six questions, including addition, subtraction, multiplication, division, and the reading and writing of numbers.

Third Subject:

Copying a printed statement, thus showing handwriting and accuracy in copying.

Fourth Subject:

Questions relating to the care and handling of furnaces, gas, water supply, etc., ventilation and sanitary matters.

[Each applicant for appointment to a position as engineer is required to exhibit a license from a State Inspector of Steam Boilers.]

[Each applicant for appointment to a position as janitor of a school building where steam heat is used will be required to exhibit a license from a State Inspector of Steam Boilers.]

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SCHEDULE B — CLASS 9.

The Fire Service of Cities other than Boston.

This examination is similar to that of Schedule B, Class 2, — the fire service of Boston.

SCHEDULE B — CLASS 10.

Truant Officers of Boston.

First Subject:

Copying printed statement.

Spelling.

Second Subject:

The answers to the questions on this sheet will be marked as a whole under two heads, — EXPERIENCE and CLEARNESS AND CORRECTNESS OF STATEMENT. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

State how long you have resided in this city, and what your occupation has been since you began to earn your living.

If you have had any practical experience in the duties of the office for which you apply, or of any similar office, state when, where, for how long and under whom you had it.

State also any experience you have had in the superintendence of others, either in public or private business.

If you are familiar with any foreign language, state what language it is, and whether you can read, write and speak it.

Write not less than ten lines. Do not sign your name.

Have you ever been employed as a public officer? If so, state what office you held, when, where, how long you served, whether you were ever discharged for cause, or requested to resign; and whether, while in office, you were ever complained of for violation of the rules of the office, or for any conduct unbecoming an officer; and, if such complaint was made, what action was taken thereon.

Where were you born? Give month, day and year.

Have you ever served in the army or navy of the United States, either in time of peace or war? If so, how long did you serve and in what capacity, and did you receive an honorable discharge therefrom?

Have you ever served in the volunteer militia? If so, name the regiment and company, and state how long and in what capacity you served, and whether you have been honorably discharged, been dismissed, have resigned or been asked to resign.

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Have you ever had the handling of men, either in public office or private employment? If so, state how many and in what kind of work.

Have you ever been convicted of any offence against the laws of this or any other State or nation? If so, make a full statement of the case, giving particulars as to date, place, your age at the time, the nature of the offence, the penalty, and all other facts relating thereto.

Have you ever been a dealer in intoxicating liquors, or a bartender? If so, when, where, and for how long?

Do you ever drink distilled or fermented liquors of any kind? If so, state fully and definitely what your habits are in such use of them. If you are a total abstainer, state how long you have abstained.

What particular qualities should a man possess in order that he may become an efficient truant officer?

Third Subject:

Arithmetic, including addition, subtraction, multiplication and common fractions.

Fourth Subject:

Letter writing.

Note. Applicants for positions as truant officers are also required to undergo a physical examination.

SCHEDULE B — CLASS 11.

Superintendents and Assistant Superintendents.

Handwriting, spelling, letter writing, arithmetic, experience and knowledge of duties.

SCHEDULE B — CLASS 12.

Divisions of the Civil Engineering Force.

Division A, or rodmen: To include chainmen, rodmen and all assistants under whatever designation, except draughtsmen, whose maximum pay does not exceed the rate of $800 per annum.

Division B, or instrument men: To include transitmen, levellers and all assistants under whatever designation, except those covered by divisions A and E, and whose maximum pay does not exceed the rate of $1,100 per annum.

Division C, or assistant engineers (junior grade): To include engineers and surveyors in responsible charge of work and engi-

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neers in charge of designing, whose maximum pay does not exceed the rate of $1,600 per annum.

Division D, or assistant engineers: To include all engineers whose pay exceeds the rate of $1,600 per annum.

Division E,* or draughtsmen (junior grade): To include all assistants whose duties are chiefly those of draughting and whose rate of pay does not exceed $800 per annum.

Division F, or draughtsmen (senior grade): To include all assistants whose duties are chiefly those of draughting and whose pay is at the rate of over $800 and does not exceed $1,300 per annum.

SCHEDULE B, CLASS 12, DIVISION A * (RODMAN).

Handwriting; shown by copying printed matter.

Spelling; twenty words, announced by one of the examiners.

Education and experience.

The answers to the questions on this sheet will be marked under the heads of EDUCATION and EXPERIENCE. *Any false statement made by the applicant in answering these questions will be regarded as good cause for excluding him from the eligible list, or for removal or discharge during probation or thereafter.*

What is the date of your birth?

State what grammar school, high school, technical school or college you have attended, the dates and length of attendance, the studies pursued and diplomas taken. State any other facts regarding your education which you think may be of service to the examiners.

Have you had any practical experience in the duties of the position for which you apply? If you have, state the particular position or positions you have held; the nature of your duties in each case; where, when, how long and under whom (giving accurately the name and address) you have been so employed.

Are you employed at present? If you are, give the name and address of your employer, state the nature of your duties and the length of time you have held this position. If you are not employed, state how long you have been without employment and the cause for which you last ceased work.

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* The examination for division A and for division E will occupy one day each. The examinations for the other divisions will occupy two days each.

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Arithmetic, — including common and decimal fractions, percentage, square root, mensuration of rectangular surfaces and solids.

Sample Questions.

1. Add 467 feet $8\frac{1}{2}$ inches, 27 feet $9\frac{7}{8}$ inches, 510 feet $4\frac{1}{8}$ inches and 102 feet $6\frac{3}{8}$ inches, and from the sum subtract 299.52 feet, giving the answer to the nearest eighth of an inch.
2. Multiply two hundred fifty-seven ten-thousandths by forty-nine thousandths.
3. Divide 2,880 by .0036.
4. Add $\frac{4}{11}$, $\frac{2}{125}$ and $\frac{3}{5}$, and reduce the sum to a decimal fraction carried to five places of decimals.
5. A dry brick weighing 4 pounds 6 ounces was immersed in water for twenty-four hours, at the end of which time it was found to weigh 5 pounds $0\frac{1}{2}$ ounce; what per cent. of its own weight was absorbed?
6. A square plot of ground contains 108,900 square feet; what is the length of a side?
7. A rectangular piece of land, 210 feet 3 inches long and 50 feet 9 inches wide, has a ditch 6 feet wide and 4 feet deep, which was dug inside the boundary lines, said lines being the outer edge of the ditch. How many cubic yards of material were removed from the ditch?

Algebra. To and including the solution of simultaneous equations of the second degree.

Sample Questions.

1. Multiply $\left(x^2-\frac{x}{3}+\frac{1}{4}\right)$ by $\left(\frac{x}{2}+\frac{1}{4}\right)$.
2. Divide $256\ a^5\ b\ c^2\ x^3$ by $-16\ a^2\ c\ x^2$.
3. Divide a distance of 1,000 feet into three parts, — A, B and C, such that A shall be 72 feet longer than B and 100 feet shorter than C. Solve by algebraic method.
4. Solve the equation $2\sqrt{x}+\frac{2}{\sqrt{x}}=5$.
5. A rectangular field contains 40,960 square feet. If its length were increased by 65 feet and its breadth by 50 feet, its area would be increased by 26,450 square feet. Find the length and breadth of the field.

Geometry. The applicant will be expected to have such familiarity with the principal theorems of plane and solid geometry as will enable him to solve simple problems dealing with lines, angles, areas and volumes. *Demonstrations of theorems will not be required.*

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Sample Questions.

1. One interior angle of a certain triangle contains 43° 19′ 40″; a second interior angle contains 105° 59′ 20″; what is the value of the remaining angle?
2. Choose any three points on paper, and by aid of a sketch explain how, by geometrical construction, you would find the centre of a circle passing through them.
3. What is the length of the circumference of a circle which would enclose an area of 5,000 square feet? $\pi = 3.1416$.
4. If a field have two parallel sides, one of them 356 feet long and the other 407 feet long, the perpendicular distance between them being 96.5 feet, what is the area of the field?
5. A stone in the form of a pyramid 3 feet high, with its base a square 30 inches on a side, will weigh how much, assuming 150 pounds weight to the cubic foot?

Duties. Questions relating to the construction and use of rods, tapes, verniers and other implements and devices. Details of the work of rodmen in the field and office. Definitions of technical terms.

Tracing. Tracing cloth and a plan or a drawing of some engineering structure are furnished the applicant, who will be required to make a tracing in India ink.

Schedule B, Class 12, Division B (Instrument Man).

Handwriting.
Spelling.
Education and experience. } Same as Division A.

Algebra. To and including the solution of simultaneous equations of the second degree.

Sample Questions.

1. Simplify, as far as possible, the expression $\dfrac{x-1-\dfrac{12}{x+3}}{x-5+\dfrac{12}{x+3}}$
2. Solve the equation $\left(\frac{a}{b}+\frac{b}{a}\right)x-\left(\frac{a}{b}-\frac{b}{a}\right)+2x=a$.
3. The circumference of the hind-wheel of a carriage is greater by 4 feet than that of the fore-wheel. In travelling 1,200 yards, the fore-wheel makes 75 revolutions more than the hind-wheel. Find the circumference of each wheel.

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4. A man has two square lots of unequal size, together containing 15,025 square feet. If the lots were contiguous, it would require 530 feet of fence to embrace them in a single enclosure of six sides. Find the area of each lot.
5. Solve, for either x or y, the simultaneous equations $\begin{cases} x^2+3y^2=28 \\ x^2+2y^2+xy=16 \end{cases}$

Geometry. The applicant will be expected to have such familiarity with the principal theorems of plane and solid geometry as will enable him to solve simple problems dealing with lines, angles, areas and volumes. *Demonstrations of theorems will not be required.*

Sample Questions.

1. The altitudes of two equilateral triangles are respectively as 3 to 4. Find the ratio of their areas, and give your reasoning.
2. Show how, by geometrical construction, you would divide a given straight line into any required number of equal parts. Give the reasoning upon which you base your construction.
3. Find the length of the perimeter of an equilateral triangle which would enclose one acre.
4. A metal cylinder 5 feet long and 8 inches in diameter is turned down in a lathe to a diameter of 6 inches. Find the total weight of metal removed, assuming 450 pounds per cubic foot.
5. A cone measures 32 feet around the base, and the length of its slope is 8 feet. Find the number of cubic yards it contains.

Trigonometry. Plane trigonometry, — trigonometrical functions, properties of logarithms and use of logarithmic table, solution of triangles, either right or oblique, by either natural functions or logarithms.

Sample Questions.

1. What do you understand by the cosine of an angle? By the tangent? By the versed sine? The sine of a certain angle is $\frac{1}{3}$; compute its cosine. What is the cosine of 135°?
2. What do you understand by the base of a system of logarithms? What is the base of the common system? In the common system, what is the logarithm of 1? Of 1,000? Of 0.01?
3. Compute by logarithms:

$$\frac{3.7096 \times 286.51 \times 0.2956}{1633.72}; \quad (23.8464)^3; \quad \sqrt[3]{0.0042937}.$$

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4. In a right-angled triangle the hypothenuse measures 154 feet, and one of the acute angles 49° 53′. Compute, by natural functions, the lengths of the sides; determine also the area of the triangle.
5. In an oblique triangle, the angle B measures 19° 21′ 40″, the angle A 103° 35′, and the side opposite B 87.36 feet. Compute, by logarithms, one of the remaining sides.

Duties. Questions relating to the details of the work of the second man in a surveying party, in the field and office, including the construction, adjustment, care and use of the transit and level; compass and stadia surveying; details of surveying and levelling, keeping field notes, measuring and computing earth work. Definition of technical terms.

Plotting. Plotting a survey by co-ordinates from field notes, inking-in plot and lettering a title.

Sample Question.

Plot accurately on a scale of 20 feet to an inch, the survey of a lot of land given in the following notes: —

Station.	Bearing.	Distance.
1.	N. 35° 0′ E.	108.00 feet.
2.	N. 83° 30′ E.	51.60 "
3.	S. 57° 0′ E.	88.80 "
4.	S. 34° 15′ W.	142.00 "
5.	N. 56° 30′ W.	129.20 "

Ink-in the plot, mark the bearing and length of each side, and letter the following title, making your own arrangement: "Plan of land belonging to John Smith, December, 1897. Scale, 20 feet to an inch." (Arrange and space all letters, and finish enough in each line to show your skill.)

SCHEDULE B, CLASS 12, DIVISION C (ASSISTANT ENGINEER, JUNIOR GRADE).

Education and experience. Same as Division A.

Algebra. To and including the solution of simultaneous equations of the second degree.

Sample Questions.

1. Find, in as simple form as possible, the value of

$$\left(\frac{2}{3y^2}-\frac{2}{xy}+\frac{3}{2x^2}\right)\div\left(\frac{2}{3y^2}-\frac{3}{2x^2}\right)$$

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2. Increase the length of a given rectangle 2 feet, and its width 1 foot, and its area is increased 12 square feet. On the other hand, diminish its length 3 feet, and its width 2 feet, and its area is diminished 11 square feet. What is the perimeter of the rectangle?

3. Francis' formula for the discharge over suppressed weirs is $Q = 3.33\, l\, h^{\frac{3}{2}}$, in which, if l and h are in feet, Q is in cubic feet per second. If h be 0.324 foot, what value of l will correspond to 5.37 cubic feet per second for Q?

4. A boat's crew rowed down stream 7 miles and back in 3 hours 20 minutes. The velocity of the current was 2 miles per hour. How many miles per hour would the crew make in still water?

5. Two loans, together amounting to $45,000, are made at different rates of interest, but the amounts borrowed are such that the respective annual interest payments are equal. If the first loan were to be charged the second's rate of interest, its annual payment would be $800; and if the second loan were to be charged the first's rate of interest, its annual payment would be $1,250. Find the respective rates of interest.

Geometry. The applicant will be expected to have such familiarity with the principal theorems of plane and solid geometry as will enable him to solve simple problems dealing with lines, angles, areas, and volumes. *Demonstrations of theorems will not be required.*

Sample Questions.

1. Explain, by reference to a sketch, how you would divide a line that is 26 inches long into three parts proportional to the numbers 2, $\frac{3}{4}$, $\frac{1}{2}$. Compute also the lengths of the respective parts.

2. A hexagonal bar of steel, 10 feet 3 inches long, measures 12 inches around the perimeter of a right section. What is the weight of the bar, at 490 pounds per cubic foot?

3. A trapezoidal lot of land, 120 feet in length, measured perpendicularly between its parallel ends, tapers uniformly and equally on both sides from a width of 24 feet at one end to 14 feet at the other end. Where should it be cut transversely, that is, parallel to the ends, so as to make two pieces of equal area?

4. The base of a pyramid contains 144 square feet. A plane parallel to the base and four feet from the vertex cuts a section containing 64 square feet. What is the height of the pyramid?

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5. A hollow cylinder 4 feet in diameter and 15 feet long, lying upon its side, is filled with water until the latter touches two-thirds of the circumference, at which time it is also within 1 foot of the top. How much water does the cylinder then contain?

Trigonometry. Plane trigonometry, — trigonometrical functions, properties of logarithms and use of logarithmic table, solution of triangles, either right or oblique, by either natural functions or logarithms.

Sample Questions.

1. The value of the sine of a certain angle is $\frac{12}{13}$. Without using tables, find the value of cosine, tangent, cotangent, secant and cosecant, and show clearly your method.
2. Three times the sine of a certain angle is equal to twice the square of the cosine of the same angle. What is the angle?
3. By logarithms obtain the value of the following expression:

$$\frac{\left(0.68291\right)^{\frac{1}{2}} \times \sqrt{5.9546} \times \sqrt[3]{61.2}}{\sqrt[5]{298.543}}$$

4. Two tangents to a circular curve of 3,000 feet radius intersect so as to include an interior angle of 157° 8′. Find the length of either tangent from point of contact with curve to point of intersection, using natural functions.
5. A distance $A\ B$ across a stream is to be determined. A base line $A\ C$, 200 feet long, is measured off on one bank, sights are taken from each end of it to B, and the angles which the lines of sight make with the base are measured, A being 104° 53′ and C 58° 11′. Compute the distance $A\ B$, using logarithms.

Duties. Questions relating to the work of the head of an engineering field party, including the special work of surveying in cities, giving lines and grades for construction, measuring and estimating earth, rock and quantities in engineering structures; definition of technical terms; surveying problems.

Engineering theory. Elementary principles of mechanics, hydrostatics and hydraulics, and their application to simple problems. Problems in surveying.

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Sample Questions.

(*Applicants are required to answer but three questions.*)

1. The notes of a survey and the calculated latitudes and departures are as follows: —

Stations.	Bearings.	Distances.	Latitudes.	Departures.
1.	N. 30° 0′ E.	328.68	284.64	164.34
2.	N. 57° 45′ E.	306.90	163.78	259.54
3.	S. 39° 30′ E.	396.00	305.58	251.87
4.	S. 37° 15′ W.	391.38	311.53	236.92
5.	N. 69° 15′ W.	465.96	165.07	435.78

Balance the survey, give the error of closure and calculate the area.

2. Two streets intersect at an angle of 42° 28′. It is desired to ease the acute-angled intersection, making the street boundary a circular curve of ten feet radius, tangent to the street lines. Give the area of the land to be taken, and the length of each line bounding it.

3. What should be the cross-section of a yellow pine beam 12 feet long, supported at both ends, to sustain with safety a centre load of 5,000 pounds?

   What should be the cross-section if the load is uniformly distributed?

   If a beam of the same length is fixed at one end only, and has the same load concentrated at the other, what should be the cross-section?

   Assume for all cases an extreme fibre strain of 1,250 pounds per square inch. The moment of inertia of a rectangle is $\frac{bh^3}{12}$.

4. Compute the number of square yards of paving in the road bed of a section of a curved street 30 feet wide, the radius of the centre line being 175 feet and the angle at the centre being 47 degrees.

5. A rectangular wall 10 feet high, weighing 140 pounds per cubic foot, would need to be how thick in order to be stable against overturning, if exposed to the pressure of water standing level with its top on one side only?

6. Compute the tension in pounds per square inch in the metal of a water pipe, if the metal be $\frac{1}{2}$ inch thick, the inside diameter of pipe 2 feet, and the water pressure that due to a static head of 207 feet.

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7. The diameter of a steam engine cylinder is 9 inches, the length of crank 10 inches, the number of revolutions per minute 110, and the mean effective pressure of the steam 35 pounds per square inch. Find the indicated horse-power.

Materials and methods of construction. Properties and characteristics of the various materials used in engineering construction; proper tests to be applied to ascertain their strength and other qualities; methods employed in preparing and placing the materials in the work; definition of technical terms.

The questions which have been given have related to stone and brick masonry, methods of laying and bonding various classes of masonry, and the qualities of the several materials entering into their construction; to the different kinds of hydraulic cements, their strengths and methods of testing; to concrete, the proper proportions of the several ingredients and methods of mixing and depositing under different conditions; to the different kinds of roads and pavements, the materials used and methods of building; to the properties and characteristics of cast iron, wrought iron and steel, to the uses for which each is best adapted, and to their strengths and methods of testing the same. Definition of technical terms in common use in engineering specifications.

SCHEDULE B, CLASS 12, DIVISION D (ASSISTANT ENGINEER, SENIOR GRADE).

Education and experience. Same as Division A.

Trigonometry. Plane trigonometry, — trigonometrical functions, properties of logarithms and use of logarithmic table, solution of triangles, either right or oblique, by either natural functions or logarithms.

Sample Questions.

1. The value of the tangent of a certain angle is $\frac{5}{12}$. Without using tables, find the value of sine, cosine, cotangent, secant and cosecant, and show clearly your method.
2. Water runs 42 inches deep in a 48-inch circular conduit. What is the area of the water section?
3. By logarithms obtain the value of the following expression: —

$$\frac{(0.68291)^{\frac{3}{2}} \times \sqrt{5.9548} \times \sqrt[3]{61.2}}{\sqrt[5]{298.543}}$$

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4. Two tangents to a circular curve of 2,900 feet radius intersect so as to include an interior angle of 157° 8′. Find the length of either tangent from point of contact with curve to point of intersection, using natural functions.
5. A distance *A B* across a stream is to be determined. A base line *A C*, 220 feet long, is measured off on one bank, sights are taken from each end of it to *B*, and the angles which the lines of sight make with the base are measured, *A* being 104° 53′ and *C* 58° 11′. Compute the distance, *A B*, using logarithms.

Engineering theory. Same as Division C.

Materials and methods of construction. Same as Division C (*except for surveyors* *).

Designing. This subject requires the applicant to make a complete design of an engineering structure in the particular line of work in which he is engaged, or in which he seeks employment, and to answer pertinent questions as to the actual work of construction. Data to the extent usually available in actual practice will be given, and from these the applicant must make the necessary computations, prepare plans and sketches, showing clearly his design, and write a brief specification of the work to be done, the whole to be in sufficient detail to enable a definite proposal to be made for building the proposed structure.

At the beginning of his second day's work each applicant has been required to announce his choice of some one of the following optional subjects upon which he elected to be examined: —

(1) Design for a plate girder bridge.
(2) Design for a through truss highway bridge.
(3) Design for a bridge abutment of masonry, with wing walls.
(4) Design for a street intersection.
(5) Advanced surveying, and surveying problems.
(6) Design for the cross-section of a trunk sewer.
(7) Design for a system of separate sewers.
(8) Questions relating mainly to excavation and embankment; heavy masonry construction in tunnels, aqueducts and walls; water-pipe laying; and the interpretation of drawings. A certain amount of choice has been permitted in the subdivisions of this class.

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* For surveyors (instead of materials and methods of construction): Advanced surveying. Questions in geodetic, topographic and hydrographic surveying; methods of accurate land surveying and levelling in cities; details of the work of laying out and grading new streets and relocating old streets; evidence of ownership in disputed boundary lines. Surveying problems.

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SCHEDULE B, CLASS 12, DIVISION E (DRAUGHTSMAN, JUNIOR GRADE).

Handwriting.
Spelling.
Education.
Experience.
Arithmetic.
Algebra.
Geometry.
Tracing.
} Same as Division A.

Instead of the subject called "Duties," which appears in the rodman's examination, the applicants for this division will be given elementary drawing.

SCHEDULE B, CLASS 12, DIVISION F (DRAUGHTSMAN, SENIOR GRADE).

Handwriting.
Spelling.
Education and experience.
} Same as Division A.

Arithmetic. Including common and decimal fractions, percentage, square root, mensuration of rectangular surfaces and solids.

Sample Questions.

1. Change the following lengths to feet and inches, giving the answers to the nearest eighth of an inch: 12.56 feet; 6.82 feet; 4.20 feet.
2. Divide one and six hundred sixteen thousandths by eight ten-thousandths.
3. Add $\frac{1}{14}$, $\frac{3}{10}$ and $\frac{9}{21}$, and from the sum subtract nine thousand one hundred forty-seven hundred-thousandths. *Carry the work to five places of decimals.*
4. Twenty-five thousand feet, board measure, of 2-inch plank were sent from the lumber yard to cover the roadway of a bridge 260 feet long and 42 feet wide. What per cent. of the planking was wasted?

Algebra. To and including the solution of simultaneous equations of the second degree.

Sample Questions.

1. Multiply $\frac{10\ a^3\ y}{9\ bx^2}$ by $\frac{3\ b^4\ x^3}{4\ a^3\ y^2}$.
2. Divide $x^6 - 6\ x^4 + 5\ x^3 - 1$ by $x^3 + 2\ x^2 - x - 1$.

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3. There are three numbers. If we add $\frac{1}{2}$ the first to $\frac{1}{3}$ the second plus $\frac{1}{4}$ the third, the sum will be 62. Or $\frac{1}{3}$ the first plus $\frac{1}{4}$ the second plus $\frac{1}{5}$ the third equals 47. Or $\frac{1}{4}$ the first plus $\frac{1}{5}$ the second plus $\frac{1}{6}$ the third equals 38. Find the numbers.
4. Solve the equation $4x - \frac{14 - x}{x + 1} = 14$.
5. A rectangular plot of ground is surrounded by a walk 7 feet wide. The area of the plot and walk is 15,000 square feet, and of the walk 3,696 square feet. Find the length and breadth of the plot.

Geometry. The applicant will be expected to have such familiarity with the principal theorems of plane and solid geometry as will enable him to solve simple problems dealing with lines, angles, areas and volumes. *Demonstrations of theorems will not be required.*

Sample Questions.

1. Through the vertex of a right angle a straight line of indefinite length is drawn, lying outside the angle. What is the sum of the two acute angles thereby formed? *Give your reasoning.*
2. If the angle at the vertex of an isosceles triangle is a right angle, what ratio exists between the base and the altitude? *Give your reasoning.*
3. Supposing a tangent drawn to a circle from a given point without; show by a sketch how you would determine the precise point of tangency. *Give the reasons for your method.*
4. The bases of a trapezoid are 32 feet and 20 feet respectively. Each of the other sides is 10 feet. Find the area of the trapezoid.
5. A cubic foot of brass is drawn into a wire $\frac{1}{8}$ of an inch in diameter. Find the length of the wire to the nearest foot. $\pi = 3.1416$.

Trigonometry. Plane trigonometry, — trigonometrical functions, properties of logarithms and use of logarithmic table, solution of triangles, either right or oblique, by either natural functions or logarithms.

Sample Questions.

1. In a triangle ABC the angle A is 90°; the side AB is 4 units long, AC 3 units, and BC 5 units. State, from inspection of the figure, the value of the cosine of the angle C; the sine of B; the tangent of C; the secant of B.
2. Construct on paper an angle of 53° 14′ by means of its tangent (to be obtained from the tables), and explain your method.

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3. Multiply 4978.3 by $(0.2916)^3$ and divide the result by $\sqrt[5]{1.985}$, using logarithms for all the computations.
4. A regular octagon is inscribed in a circle of 8 feet diameter. Compute the length of a side, using only natural functions for the angles.
5. From a point in the same horizontal plane with the base of a tower, the angle of elevation of its top is 50° 39′; and from a point 100 feet further away it is 35° 16′. Required the height of the tower.

Duties. Questions relating to the implements, materials and methods used in making maps and plans. Details of plans, such as lettering titles, coloring and ornamenting; scales, north points, etc.

Methods of duplicating, preserving and cleaning plans, etc.

Tracing. Same as Division A.

Plotting. Plotting a survey by co-ordinates from field notes, inking-in plot and lettering a title.

Sample Question.

Plot accurately, on a scale of 30 feet to an inch, the survey of a parcel of land given in the following notes: —

Station.	Bearing.	Distance.
1.	N. 48° 30′ E.	213.00 feet.
2.	S. 42° 15′ E.	193.80 "
3.	S. 49° 15′ W.	162.00 "
4.	N. 82° 15′ W.	77.40 "
5.	N. 42° 45′ W.	133.20 "

Locate station one 5½ inches from the bottom of the drawing paper and two inches from the left margin.

Ink-in the plot, mark the bearing and length of each side, draw a north point and letter the following title, making your own arrangement: "Plan of land in Boston belonging to John Smith, March, 1898. Scale, 30 feet to an inch."

Drawing. This subject calls for the making of a detailed drawing of an engineering structure, the whole to be finished in India ink and neatly lettered. A rough sketch will be furnished, giving the general dimensions of the structure, and such other data will be supplied as a chief draughtsman or designer in actual practice would give to his assistant to enable him to prepare a set of working drawings.

In examinations already held, the applicants have been required to make the drawings of a masonry abutment for a highway bridge.

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FORMS FOR APPOINTING OFFICERS.

[The following forms are furnished for the information and convenience of officers making appointments to positions in the classified service of the Commonwealth and the cities thereof. They are furnished merely by way of suggestion, and not as forms prescribed by law to be strictly followed.]

Form for Nomination, by a Mayor, of Police Officers—Probationary Term.

I hereby nominate, subject to the approval and confirmation of the Board of Aldermen, , to be a police officer of the city of , with all the powers of a constable except the power of serving and executing civil process, to hold said office for a probationary period of six months, as provided in the civil service rules of the Commonwealth, unless sooner discharged.

Form for Nomination, by a Mayor, of Police Officers—After Probationary Term.

, having served as a police officer for a probationary period of six months, and his conduct and capacity having been found satisfactory, I hereby nominate, subject to the approval of the Board of Aldermen, said , to be a police officer of the city of , with all the powers of a constable except the power of serving and executing civil process.*

Form of Warrant for Police Officer appointed for Probationary Term.

This is to certify that has been appointed a police officer of the city of , with all the powers of a constable except the power of serving and executing civil process, said appointment being made under the civil service rules of the Commonwealth for a probationary term of six months, beginning on the day of A D. 19 .

* In cities where the ordinances provide that appointment shall be made for a limited time, it would be well to add, "to hold office for the term and according to the tenure prescribed by the laws and ordinances."

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Form of Warrant for Police Officers appointed after Probationary Term.

This is to certify that , having served a probationary period of six months, as required by the civil service rules of the Commonwealth, has been appointed a police officer of the city of , with all the powers of a constable except the power of serving and executing civil process.*

Form of Notice to Persons, other than Police Officers, appointed for a Probationary Term.

This is to inform you that, under the provisions of the civil service rules, ha selected you for appointment to the position of in the for a probationary term of six months from the date when you begin service. Should your conduct and efficiency during such probationary term prove satisfactory, you will, at its close, receive a regular appointment; otherwise your appointment will cease. The salary attached to such position is at the rate of $.

This conditional appointment does not preclude prompt discharge from service at any time during such probationary term, in case of misconduct or inefficiency.

A prompt reply is requested, stating whether this appointment is accepted, and giving the earliest date when you can present yourself for service.

Notice to Persons, other than Police Officers, appointed after Probationary Term.

Your conduct and capacity, during the probationary term of six months, having been found satisfactory, you are hereby appointed a in the department [or office] at a salary of $, beginning on the day of , A.D. 19 .

Notice to Persons whose Conduct or Capacity has not proved Satisfactory during the Probationary Term.

I have to inform you that your conduct [or capacity] during your employment in department as , for a probationary term of six months, has not been found satisfactory, and that, in accordance with the terms of your original appointment, as prescribed in the civil service rules of the Commonwealth, your employment in said department will cease on the day of , A.D. 19 .

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* See note to second form.

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INDEX.

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INDEX.

A.

PAGE

Act, civil service 62-79
Age of persons examined 14, 25, 39
  limit of 85, 86
  of applicants for positions in Schedule B 85, 86
  of call men 86
  of call substitutes for examination 85
Aldermen, recommendation of 66
Applicants, complaints to be made in writing 104, 111
  character of 84
  eligible two years 89
  instructions to 117
  may be required to furnish additional certificates of character . . . 84
  may inspect their examination papers 12, 104
  must obtain 65 per cent. 118
  must prove good character 84
  must present themselves promptly for examination 105
  qualifications of 84
  residence and citizenship 84, 97
  shall be notified of the result of examination 89
  when excluded from examination and from the eligible list . . . 84, 87
  when entitled to a hearing 85
Application 65, 86-88
  date of reception 87
  defective applications returned 87
  false statements in 87, 97
  form of 86
  may be made at any time 86
  must be filed at least one week before examination 119
  must be on blank form 86
  must be supported by certificates of good character, etc. 87, 97
  must be under oath 65, 97
  new application, when filed 87
  not received from any vendor of intoxicating liquor, or person habitually using intoxicating beverages to excess, or any person convicted of any offence against the laws within the year 66, 84, 97
  of veterans 87
  papers may be destroyed 63
  papers remain on file 111
  statements contained in 65, 86
  when defective, will be returned 87
  where filed 86, 87, 117
  where special qualifications are required, may be made by non-residents . 84
Appointed, but not employed 92

Digitized by Google

PAGE
Appointing officers, cannot receive or consider recommendations made by senators and others, except as to character and residence of applicants . 66
forms for 191
may summon applicants before them 93
must return papers 93
must select from those certified 66, 90, 92
request for further certification of person 91
to be furnished with the examination papers of persons certified . . . 93
to report appointments 66, 94, 99
to send notice of selection, rejection, transfer, promotion, etc. . . 66, 94
Appointments 14, 15, 25, 39, 66, 92
after dismissal 94, 101
after previous service 94, 101
can be made only in accordance with rules 92
in cases of emergency 94, 100
must be reported 66, 94, 100
no person shall be appointed without requisition 90
number of veterans 15, 25, 39, 42, 46, 50, 53, 59
permanent 92
probationary 92
provisional 93
responsibility for 80
shall not be affected or influenced by political or religious opinions or affiliations 88
temporary service 94
temporary, without examination, for not more than ten days 94
to be made from names certified 67, 90, 92, 99
when less number made than requisition calls for 91, 100
Architects and architectural draughtsmen 9, 83
Assessments for political purposes 68, 69
Attorney-General may file information 70

B.

Boards of examiners 6-8, 63, 81, 104
names 6-8
regulations for 104
special instructions 112
Boys in labor service classified 96

C.

Call men, Boston fire department 65, 85
Cambridge labor service 15, 46-49
Certification 90, 91, 110
additional names 92, 100
by reason of proficiency in any special subject 91
confined to three highest 90
disqualified for 110
method of 91, 110
more than three times 91
of veterans who have passed examination 90
of three most eligible persons 90
of persons of one sex 91
soldier exemption law 67, 68, 87, 89
soldier preference 64, 67, 68, 85, 90

Digitized by Google

Certification — *Concluded.* PAGE
three separate times 77, 91
to fill more than one vacancy 91
upon non-competitive examination 93
under exemption law 67
when void 90
where special qualifications are required 91
Character of applicants 84, 87
burden of proof as to 84
certificates of 84, 87
when found bad 84
Chief examiner, appointment and duties of 62, 103
Chief superintendents exempted 83
Chiefs of police 64
Citizens, applicants must be 84
City physician to make physical examinations 89
Civil engineers 83
divisions of 177, 178
examination for 178-190
Civil service act and amendments 62-79
Classification of service 81
Clerical assistance, commissioners may apply to the proper authorities . . 81
Commissioners, cannot advise as to vacancies, etc. 111, 118
expenses of 62
how appointed 62
may appoint chief examiner and secretary 62
may subdivide classes 88
may summon witnesses 62
names and addresses 5
report of 9-16
salary of 62
shall keep records of all proceedings 63
term of service 62
to prepare rules 63
to report to General Court 63
to supervise and administer the rules 63
Compensation of examiners 105
Complaints may be made to commissioners 104, 111
Condition, physical, failure in 106
Conduct, criminal or infamous 84
Contributions for political purposes 68, 69
Conviction of offence against the laws within the year 66
Councilman, recommendation of 66

D.

Dates of examinations 119-138
Deaths to be reported 94
Deputy superintendents 83
Discharges, to be reported to the commissioners 66, 67, 94
of laborers for cause 101
responsibility for 80
Dismissal, appointment after 94, 101
Dismissals to be reported 66, 67, 94
Disqualifications 66, 84, 98, 101, 110
Dissolute habits of applicants 84

Digitized by Google

PAGE
District police 67, 82, 83, 85, 150
age 85
examination for 159-163
height 85, 86
Draughtsmen 83, 178, 186
Draw-tenders and assistant draw-tenders 83
examination for 169

E.

Education of persons examined and passed 14, 25, 39
Elections, office holders forbidden to use their official authority 69
Electricians 9, 83
Eligibles, in Schedule A, Class 2, may also be placed in Class 1 110
instructions to 117
list open to inspection 66
persons remain two years on eligible list 89
priority of date no advantage 110, 118
prison service, names may be placed on other list 110
register of 89, 110
State eligibles may be placed on list of city in which they reside and *vice versa* . 118
when may be removed from list 87
Emergency, definition of 94, 100
appointments must be reported within five days 100
temporary appointments 94
Engineers of public buildings 65, 83, 174
in labor service classified 96
other cities 83
Everett labor service 15, 59
Examinations 14, 19-40, 88, 105-107
appointing officer to be furnished with papers of persons certified 93
applicants must obtain 65 per cent. 118
applicants must present themselves promptly 105
commissioners may apply for temporary quarters 81
competitive 14, 19, 105
dates of 119-138
exclusion from, on account of bad character, etc. 84
for positions not classified 96
for promotion 95, 106
how conducted 105
in cities other than Boston and in towns 20-23
in technical or special subjects 88
marking in 89, 107
no questions as to political or religious opinions 65, 88
non-competitive 14, 19, 40, 95, 105, 107
notice to appear for 87, 88, 117
number of 14, 19, 26-40
number of persons examined, passed and appointed . . . 14, 24, 25, 39
papers may be destroyed 63
papers open to inspection of applicants 12, 104
papers to be furnished to appointing officers 93
papers remain on file 111
physical 89
schedule of 119-138
shall be practical and impartial 65, 88
special 88, 107

Digitized by Google

Examinations — *Concluded.* PAGE
specimens of papers 139-190
subjects designated 88
tabulated statements of 26-39
time and place for, to be designated by commissioners 88
to test physical condition 89, 105
to be practical 65, 88
veterans notified first 88
when and where held 88, 119-138
Examiner, physical 6, 106
Examiners, boards of 6-8, 63, 81, 104
compensation of 105
designated by commissioners 63
duties of 104
names of 6-8
regulations for 104
special instructions to 112
when cannot serve 63, 105
who become applicants must vacate office 105
Executive Council, confirmation by 64
Exemption of veterans from examination 67, 89
Exemptions from classification 64
Experts designated to assist at examinations 81

F.

Fall River, reserve police force 75
False statements in application papers 87, 97
Fire inspectors 83
Fire service in Boston 65, 82, 85, 105, 106
age 77, 85
age of call substitutes 85
call force 65, 85
call men certified on educational standing 106
call substitutes 85
failure in physical condition 105
occupation of eligibles 11
physical examination 89
promotion 95
weight given in physical examination 106
Fire service, cities other than Boston 10, 77, 83, 86, 115
Foreman and sub-foreman of laborers 83
examination for 170-173
Forms for appointing officers 191

G.

General average standing, must obtain 65 per cent. 118
Grading 88, 89

H.

Health, when ill health or physical disability may disqualify 110
Height of applicants for positions in Schedule B 85, 86

Digitized by Google

I.

Information may be filed by Attorney-General
Inspectors . . . 82, 83, 143, 144, 159.
Instructions to applicants and eligibles
to examiners
Investigations, commissioners may summon witnesses

J.

Janitors of public buildings . . . 65, 83.
Judicial officers, exemption

L.

Laborers and mechanics . . . 15, 41–61, 65, 68, 96–
age limit recognized . . . 68,
applicants must renew eligibility
Boston . . . 41–43
boys in service classified
Cambridge . . . 15, 46–4
certificates for special service
certificates not received from appointing officer unless, etc.
cities to which rules apply
city may appropriate a sufficient sum . . . 71, 97
commissioners may refuse to register
commissioners may require examinations
discharge for cause . . . 43, 48, 51, 54, 57, 60, 101
Everett . . . 15, 59–61
in cities . . . 68, 71
method of registration . . . 97, 98
must produce certificates as to character and capacity
must be citizens and residents six months
New Bedford . . . 15, 50–52
Newton . . . 15, 56–58
not to be employed in labor other than that for which certified
number registered, certified and appointed . . . 41–61
number of veterans registered and appointed . . . 15, 41–61
preference of veterans
registrar of . . . 5, 62, 104
registration and certification, when discontinued in cities
registration, selections, etc. . . . 65, 96–102
reinstatement
requisitions for
requisitions for young men . . . 68, 99
selection from certified list
selection in cases of emergency
suspension for six months
tabulated statement . . . 41–61
transfer of
veterans must produce certificate of service in army or navy
veterans, registration and employment of . . . 96–102
when discharged for incompetence, etc.
when failed to respond after notification
Worcester . . . 15, 53–55

Digitized by Google

PAGE
Law, civil service 62-79
city may appropriate money for enforcement of 71
Liquor, no application received from a person habitually using, to excess . . 66, 84
city shall not pay for 70
use of 66, 84
vendors of 66, 84
Lowell, fire service 73

M.

Marking and grading 89, 107-109
Massachusetts Reformatory, officer in county jail may be transferred to . . 72
Mechanics and laborers 15, 41-61, 65, 68, 96-102
Medal of honor 67
Messengers 82, 147
examination for 147
Metropolitan park police, qualifications 85
physical examination 150
Milton, town of, police and fire departments classified 74
Military service, restoration after 68
Moral qualifications 84

N.

Natick, police and fire forces 76
New application, when can be filed 87
New Bedford labor service 15, 50-52
Newton labor service 15, 56-58
Non-competitive examinations 14, 19, 40, 95, 106, 107
Non-residents, when may be examined 84
Notice of selection, appointing officer to send 66, 94, 99

O.

Office boys 82
Office-holders forbidden to use their official authority and influence in certain cases 69
Officers of department 5
Offices not classified 64, 96
not included in rules, applicants may be examined 96
Official authority, corrupt use of 68, 69

P.

Pelletier, Joseph C., appointment 9
Penalty for violations of rules 70
Percentum of proficiency fixed by commissioners 88
Permanent appointments after probation 92
Physical examinations, commissioners will provide for 89
by whom made 89, 106
blanks 149, 153, 158, 162, 166
condition shall not fall below 65 per cent. 106
condition, failure in 106
defect, physical 110
for State Prison and Massachusetts Reformatory applicants . . . 106, 149
how marked 106
incapacity 110

Digitized by Google

Page
Physical examiner 6, 12
Plumbing inspectors, examination for 14, 75
Police of Boston . . . . . 83, 86, 1[illegible]
applicants measured in bare feet and weighed naked . . . . . [illegible]
applicants who fail in physical examination . . . . . [illegible]
age, height, weight . . . . . [illegible]
failure in physical condition . . . . . [illegible]
occupation of eligibles . . . . . [illegible]
weight given in physical examination . . . . . [illegible]
Police of other cities, age, height, weight . . . . . [illegible]
reserve officers . . . . . 72, 83, [illegible]
special police . . . . . 57, [illegible]
to include all doing police duty, permanently or temporarily . . . . . [illegible]
Politics not to be revealed in examinations 59
Porter, Charles H., expiration of service . . . . . [illegible]
Preference, veteran . . . . . 64, 67, 68, 85, 88, [illegible]
Prison service, age of applicants 74, 83
names of eligibles may be placed on other list . . . . . [illegible]
minimum height and weight 83
when physical examination required . . . . . 106, [illegible]
Probation 64, 92
original appointments 92
Promotion 64, 90
of veterans 90
to be reported to commissioners 66, 94
veteran preference 64, 90
Provisional appointment 93
when shall cease 93

Q.

Qualifications 84
moral 84, 87
physical 89, 105, 108
special 88, 91
Quo warranto, Attorney-General may file 70, 74

R.

Reappointment 68, 94, 101
to same office without examination 94
Recommendations from senators and others, except as to character and residence, cannot be received or considered by appointing officers 66
Recommendations to be preserved 63
Records open to public inspection 12, 63
preservation of 63
Reduction in rank 80
Refreshments, wines, liquors, cigars, etc. 70
Register of eligibles 89, 110
Registrar of labor 5, 62, 104
Registration clerks in cities 5
Regulations 103-111
commissioners to issue 80
Reinstatement 68, 94, 101
Religious belief not to be revealed in examinations 65

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PAGE

Removals, an act to regulate 78
notice and hearing given to person removed 78
responsibility for 80
to be reported to commissioners 67, 94
Report of commissioners 9–16
Report of secretary and chief examiner 19-40
Reports, appointing officer to report appointments, transfers, etc. 66, 94
appointing officers to report every temporary appointment 94
Representative, recommendation of 66
Request, by appointing officer, for further certification of person 91
Requisition to be made 90
for names of veterans 90
for laborers 98
how filled 90-92, 98
when unable to fill 93, 99
Reserve police 72, 83, 92
of Fall River 75
Residents, applicants must be 84, 97
Resignation, appointment after 94
must be reported 94
Restoration to list 89, 90
Rodmen 83, 177, 178-180
Rules 80-102
changes shall be published 64
given general or limited application 63, 64
may be altered or rescinded 63
penalty for violation of 70
prepared by commissioners and approved by Governor and Council . . 63
publication of 64
shall be published and printed for distribution 64

S.

Schedule of examinations 119-138
School committee, appointments by 64, 65, 83
School janitors in Boston 65, 83, 174
in cities other than Boston 83, 174
Secretary, appointment and duties of 62, 103
report of 19-40
Selection, method of 90, 91
to be made from names certified 67, 90
Senator, recommendation of 66
Soldiers' exemption 67, 89
preference 64, 67, 68, 85, 88, 90
Somerville fire department, appointments in 73
Special examinations 88, 107
Special police 83, 92
Special qualifications 88, 91
certification by reason of proficiency in 91
Statements, false 87, 97
State prison service, age of applicants 74, 85
officer in county jail may be transferred to 72
Stenographers 81, 82
examination for 145
Strength tests 106
blanks 155, 168

Digitized by Google

PAGE

Subdivision of classes 88
Subscription for political purposes 68, 69
Substitute officials 92
Superintendents and assistants 83
Supernumerary officials 92
Surveyors classified 83
Suspension 78, 89, 101
  an act to regulate 78
  notice and hearing given to person suspended 67, 78, 79

T.

Teachers exempted 64
Technical subjects, examination in 88
Temporary service, appointment for 94
Towns, provisions of civil service act extended to 71
Transfers 72, 95
  notice and hearing given to person transferred 78, 79
  of laborers 101
  upon non-competitive examination 95
Transitmen 83, 177, 180–182
Truant officers in Boston 65, 72, 83, 86, 176
  age of 86
  examination for 176

V.

Vacancies, method of filling 90
  no advice as to 111, 118
Vendors of intoxicating liquors cannot apply 66, 84
Veterans exempt from examination 67, 89
  certification of 90
  labor service, number registered and employed 15, 41–61
  meaning of word veteran 67
  not to be removed without a hearing 67, 78, 79
  number appointed without examination 14, 25
  number examined, passed and appointed 25, 39
  physical impairment 67
  precedence in notification for examination 88
  preference in appointments 64, 67, 68, 90
  preference in promotions 64, 96
  promotion of 96
  requisitions for 90
Violations of civil service law and rules 13, 70
Visitors 81, 82
Vouchers of character 84, 87

W.

War, restoration to public service 68
Warren, Bentley W., resignation 9
Warren, Charles, appointment 9
Watchmen 82
Wines, liquors, etc., city shall not pay for 70
Witnesses, commissioners may summon 62
Worcester labor service 15, 53–55

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Approved by

The State Board of Publication.

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Commonwealth of Massachusetts.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts in General Court assembled.

The undersigned commissioners, appointed under the provisions of chapter 476 of the Acts of 1893, entitled "An Act to provide for the appointment of a Highway Commission to improve the public roads, and to define its powers and duties," and under the provisions of chapter 474 of the Acts of 1900, entitled "An Act relative to the Massachusetts Highway Commission," herewith submit their thirteenth annual report.

W. E. McCLINTOCK.
HAROLD PARKER.
JOHN H. MANNING.

BOSTON, MASS., JAN. 2, 1906.

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ANNUAL REPORT

OF THE

MASSACHUSETTS HIGHWAY COMMISSION.

In accordance with the provisions of chapter 280 of the Acts of the year 1903, the commission has had the sum of $450,000 for new work during the year.

Considerable sums allotted for expenditure during the year 1904 were actually disbursed during the year 1905, unavoidable delays having prevented the completion of several contracts.

Additional lay-outs were made during 1905, amounting to 298,568 feet (56.55 miles), bringing the grand total up to 3,286,414 feet (622.43 miles). The number of miles of road finished during the year was 62, making a total of about 610 miles of completed State highway at the end of the year 1905. On most of the remaining 12 miles laid out but not completed the work is in various stages of progress, although in a few instances no work will be done under the contracts before the coming spring.

Since the passage of the "small town act," in 1900, 95 miles of road in the "small towns" have been improved.

Meetings of the Commission.

The commission has held 80 meetings at its office in Boston during the past year, besides many others at different points in the State.

The regular county hearings, provided for in the statutes, have been held. In three of the counties there were no town representatives. In other counties the number attending was small. The intention of this law was that methods of road construction should be discussed, and in the early years of the commission much good resulted from interchanges of experi-

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ences. The hearings were thus beneficial both to the commissioners and to the town officers; but they have gradually developed into meetings where the claim is made by some particular town for some particular road. The commission, from its long experience, is familiar with most of the roads in the Commonwealth, and it feels that arguments of this kind can more profitably be made in the Boston office than at such county hearings. The commission therefore recommends that the act requiring these annual hearings be repealed. By its repeal just as effective results will be obtained, and a saving of from $300 to $400 a year will be effected.

Contracts.

All work done by the commission must be done by contract, either with the town or city authorities, or, after due advertisement, with private contractors.

During the year 98 contracts for State highways were entered into, of which 23 were with town or city authorities and 75 with private individuals or corporations.

Petitions.

The total number of petitions for the location and construction of State highways up to the date of this report is 708. During the year 1905, 35 new petitions were received. These petitions cover altogether 1,784.82 miles of road, and they are from 285 towns and 27 cities. The petitions received during the past year cover 73.96 miles of road not previously petitioned for.

Street Railways.

There are at the present time street railways operating on State roads in 127 different cities and towns. In 6 of these municipalities there are two different companies.

The length of street railway track in the State on Sept. 30, 1905, according to the Massachusetts Railroad Commissioners, was 2,776 miles.

Notwithstanding the cost and annoyance of changing the tracks of street railway companies to secure a better adjustment of roadway and railway, the relations between the officers of the different companies affected and the commissioners are

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friendly. The commissioners realize the financial condition of many of these street railways, and use every effort in their power to make the burden as light as is consistent with permanent construction.

Tracks that have been laid during the past few years are generally laid in a manner not to require a future movement either in alignment or grade. With some of the older railways it is different, and occasionally the changes called for by the commission are a serious financial burden.

The commission has not felt justified in changing its policy with regard to street railways, that policy being to pay to the company moving its tracks, under an order of the Board, a sum equivalent to what the State would have to pay for grading the highway if the grading had not been done by the street railway company. This is not always accurately obtainable, but a reasonably good estimate can be made.

County Assessments.

In accordance with the provisions of the statutes, the several counties in which State roads are built are required to repay to the State one-quarter of the amount expended during the year. The time of this repayment may, if desired, extend over six years from the date of the assessment; but in several instances, including some of those in which the amount of the assessment is greatest, the counties have preferred to pay the entire sum due at the end of each year. The amount assessed upon the counties during the year 1905 was $133,134.17.

Culverts and Bridges.

Most of the culverts and short bridges built during the past year have been of reinforced concrete.

The following bridges of reinforced concrete were built during the year: —

Colrain, . .	A reinforced concrete beam and floor bridge of 24 feet span, over a canal.
Concord, . .	A reinforced concrete arch of 75 feet span, over the Assabet River, near the State Reformatory.
Deerfield, . .	A reinforced concrete beam and floor bridge, over the Bloody Brook.

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Grafton,	A reinforced concrete beam and floor bridge of 24 feet span, over the Quinsigamond River.
Palmer,	A reinforced concrete beam and floor bridge of 15 feet span, over King's Brook (under contract, but not completed).
Sandwich,	Scorton River bridge repaired.
Tewksbury,	A reinforced concrete beam and floor bridge of two spans, of 19 and 19½ feet, with a concrete pier.
Wilbraham,	A reinforced concrete extension of an arch of 12.8 feet span.

On the whole, the reinforced concrete work has been satisfactory.

There are indications of disintegration in spots on the surface of five or six abutments built in salt water. These defects do not affect the strength of the structures, and probably will not. A careful study is being made, to determine whether these faults are due to ice action or to chemical action, and proper precautions will be taken to prevent any trouble of this kind in the future.

The two bridges over the Weweantit River, near the dividing line between Wareham and Marion, built in 1901, and supported by cast-iron piles, and which showed slight settlement last year, have been raised to true grade, and show no further settlement.

Construction.

No material change has been made during the past year in the method of building roads. On no State road has there been a failure of well-laid telfording foundations, or any V-shaped drains.

The gravel road in Swampscott has been resurfaced with gravel rather than broken stone, to secure further information as to the value of gravel as a surfacing material.

The Attleborough road, which was graded and covered with gravel in 1901, was surfaced with trap rock this year. The results of this experiment are very satisfactory. The finished road cost less than it would if the broken stone had been spread on the loose gravel. This saving is due to the reduced quantity of broken stone, when laid on a firm subgrade. Although the cost of the broken stone was $2.08 per ton, the cost per square yard was but $0.42¼.

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Maintenance.

The law of 1900 requires a payment to the Commonwealth by each municipality in which State roads are built of the cost of maintenance of such roads, but not exceeding $50 for each mile of State road in the respective municipalities. The total cost of repairs was $57,455.90 in 1905; there will be paid back into the State treasury, on account of maintenance, the sum of $39,358.82, or about 68.5 per cent. of the total cost.

At the present time State roads are maintained by contract in 28 cities and towns, covering a length of 85.84 miles. Contracting is only resorted to on maintenance when it is practically impossible to secure labor in any other way at times when it is most needed.

Resurfacing has been done on parts of the State roads in Auburn, Chicopee, Chelsea, Beverly, Great Barrington, Hadley, Marion, North Adams, Pittsfield, Sturbridge, Quincy, Rochester, Townsend and Westport. An analysis of the work on these roads is given in the accompanying table.

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TABLE SHOWING COSTS OF RESURFACING WITH BROKEN STONE MASSACHUSETTS STATE ROADS DURING 1905.

TOWN OR CITY.	Year of Lay-out.	Length (Feet).	Width (Feet).	Square Yards.	Tons of Stone.	Broken Stone per Square Yard per Year (Tons).	Cost.				Kind of Stone used.
							Totals.	Per Square Yard (Cents).	Per Square Yard per Year (Cents).	Broken Stone in Place, per Ton.	
Auburn,	1895-6-7	10,167.8	15	16,947	4,696.4	.0351	$7,526 87	44.4	5.625	$1 49	Local.
Chicopee,	1897-8-9	3,550.0	15	5,917	1,040.8	.0215	2,133 33	36.0	4.404	2 04	Trap.
Chelsea,	1901	3,053.1	24	8,820	2,877.7	.1088	4,848 09	55.0	18.322	1 60	Trap.
Beverly,	1895	3,025.0	18	6,722	931.4	.0153	1,946 73	29.0	3.218	2 09	Trap.
Great Barrington,	1894-6	9,368.0	15	15,615	1,300.0	.0115	2,912 00	18.6	2.476	2 24	Trap.
Hadley,[1]	1894	2,788.0	15	4,647	1,649.3	.0394	3,884 70	83.6	9.288	1 78	Trap.
Marion,[2]	1903	782.7	15	1,305	200.0	.0170	350 00	26.8	2.979	1 75	Local.
North Adams,	1894-6	9,000.0	15	15,000	1,800.0	.0139	3,762 00	25.1	2.904	2 09	Trap.
Pittsfield,	1894-8	6,842.0	15	11,402	1,020.0	.0108	2,182 80	19.1	2.309	2 14	Trap.
Sturbridge,	1897	3,094.0	15	5,157	1,107.0	.0307	1,751 60	34.0	4.852	1 50	Local.
Quincy,	1899	2,605.7	30	8,400	1,353.0	.0322	2,976 60	35.4	7.087	2 20	Trap.
Rochester,[3]	1903	3,345.0	15	5,595	1,067.6	.0239	1,868 28	33.4	4.173	1 75	Local.
Townsend,	1896-7-8	3,700.0	15	6,167	821.7	.0174	1,565 94	25.4	3.308	1 91	Trap.
Westport,	1894	3,015.0	18	6,030	1,065.5	.0221	2,503 90	41.5	5.190	2 35	Trap.

NOTE. — Broken stone per yard per year $\times .80 \times .33 \times 36 =$ depth of wear in inches per year of finished road; or multiply the figures in the column marked "Broken Stone per Square Yard per Year (Tons)" by 9.5.

[1] $932.45 was used for side drains and strengthening the roads.

[2] Original road macadamized by the town in 1896.

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The 13½ miles resurfaced during the year are probably a fair average of what will need to be done each year.

Continuous repairs of the road surface and water-ways, and resurfacing when the surfacing material is worn through, is the only way to insure a permanently good road. The cost of this work is dependent upon the miles of roads, and therefore it will increase year by year as new roads are built.

An analysis of the maintenance tables shows that the cost of this work in 61 towns was less than $50 per mile, in 60 towns from $50 to $100 per mile, in 109 towns in excess of $100 per mile, the average cost being $111.56 per mile.

In studying the table of cost of resurfacing with broken stone it should be borne in mind that a cubic yard of stone is assumed to weigh 1¼ tons; that the loose broken stone is compacted under the roller, and shrinks 33 per cent.

The high rate of wear shown in Auburn and Hadley is due to strengthening the road, when resurfacing, by an increased depth of broken stone; the high rate of wear in Quincy and Chelsea is due to heavy traffic; in Sturbridge, to a poor grade of stone used in the original construction.

Chapter 279, Acts of 1905, gives the Highway Commission exclusive care and control of all shade trees within the limits of State highways.

Chapter 381, Acts of 1905, provides for suppressing the gypsy and brown-tail moths. The Highway Commission has been notified by the different town officers, acting under section 6 of chapter 381, to remove these pests from State highways. Acting under the advice of the Attorney-General, the commission has entered into contracts, either with town officials or private contractors, for carrying out this work.

The commission would recommend that there shall be appropriated out of the treasury of the Commonwealth the sum of $70,000 for the proper maintenance of the State highways, subject to the provisions and limitations of section 16 of chapter 47 of the Revised Laws.

"Small Town" Work.

Under the Acts of 1900 and 1901, relating to "small towns," the commission has expended to Dec. 1, 1905, or contracted for the expenditure of, $179,875.17, and has improved 94.2

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miles of road; 3.3 miles are now under construction. The sum of $134,456 has been spent in towns whose valuation is less than $1,000,000, covering a length of 75.3 miles. It may be said that the "small town" work in its operation and effect is as valuable to the public as has been hoped and expected. In previous reports the commission has had occasion to say that this method of aiding the towns was highly satisfactory to it and to the public at large, and that its scope might well be enlarged so that a larger amount than 40 per cent. of the small appropriations made by the remote towns might be available. That the work is a great public benefit there can be no doubt. The commission does not find, in the light of another year's experience, that any material change in the methods thus far used and previously reported can be suggested.

There are certain roads in remote parts of the State, which, by reason of their locations, cannot be improved for some time. Many of these ways are of some consequence, since they serve as means of intercommunication between more important places.

The commission is glad to report that the users of such roads have sometimes made contributions toward their improvement, with the understanding that the money was to be expended under the direction of the Board. Such, for instance, has been the case of the wild and rough road over Morey Hill in Becket, — a road almost impassable, and yet much needed by persons going to and from Berkshire, and especially by automobilists. These automobilists have raised and placed in the hands of the commission a sum of money to be used in the improvement of this road. With this money the road over the hill has been so much improved that the greatest difficulties have been removed, and the road made satisfactory for the time being. This is referred to as indicating the public sentiment so far as the work that the State is engaged in doing is concerned. Both the towns as communities and the people as individuals are anxious and willing to help by their own efforts.

There have been received 364 petitions from 111 towns, and 264 allotments in 92 towns have been made to date.

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Lynn Road.

On May 26, 1902, a special appropriation of $100,000 was made for building a road outside of the Boston, Revere Beach & Lynn Railroad, between the Saugus River and Commercial Street in the city of Lynn.

The contract for building the embankment to grade 12 was awarded to Mr. Fred E. Ellis of Melrose on Nov. 13, 1903. Mr. Ellis began work on April 4, 1904, and finished on Sept. 16, 1905.

The quantities on this work are as follows, viz. : —

Cubic yards of earth fill,	94,642
Cubic yards of rock embankment,	16,024
Square yards of riprap,	4,200
Portland cement concrete culverts,	3
Feet of drain pipe,	132

Owing to the depth of fill in the embankments and the character of the ground on which the embankments are built, the commission did not deem it wise to place the broken stone, curbing, paved gutters, riprap or guard rail until next year. The delay in finishing is to give the embankment time to settle, thus saving the loss of costly materials and the expense of repairs.

The contract for completing the road will be let during the winter, and it is hoped that it will be finished before the summer season of 1906 opens.

Steam Road Rollers and Stone-crushing Machinery.

The commission has now under its control 16 steam rollers and 2 portable stone-crushing plants. One roller was transferred to the town of Wakefield by the provisions of the Acts of 1905, chapter 93. This roller was seriously injured several years ago by a fire in the building in which it was stored. It would have cost excessively to repair it suitably, but the town has had it repaired to such an extent as to make it of some use locally.

The steam rollers were used 711 days on town work in 21 different towns. All requests by towns for work of this charac-

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ter were granted. The rollers were also used 134 days on State highway repair work, on 24 different roads; 339 days by towns contracting for building State roads, including the "small town" roads; 239.5 days by private contractors on State highway contracts; and 22 days by a street railway company in connection with road work. The total number of days' work during the year was 1,445.5, — an average of 90.3 days for each roller.

The total cost of maintenance for the year was $2,892.78. Of this amount, $2,110.50 was paid for practically rebuilding three of the rollers, Nos. 5, 8 and 10, which have been in active service since 1896–97; and $782.28 was expended for the ordinary repairs, — an average for such ordinary repairs of $1.12 per day for each roller in use.

The number of requests from town officials for the use of the rollers has been about the same as in previous years.

Several of the rollers purchased in 1896 and 1897 will probably have to be sent to the shop this year for thorough repairs.

One of the portable crushers has been located in the town of Sandisfield, where it has done good service; the other was used in Carver and Pembroke. The stone for 1.64 miles of stone road was crushed by these machines, — a total of about 2,900 tons. The entire cost of operation, repairs and moving has been borne by the towns using the machinery.

Surveys and Engineering Office Work.

During the year surveys for preliminary studies, estimates and lay-outs were made in 56 towns, — a total length of 68.43 miles; and grade stakes for construction work set in 100 towns for a length of 89.86 miles, part of these being for unfinished work in 1904.

Final surveys were made in 57 towns, — a total length of 54.72 miles. Surveys for "small town" work were made in 26 towns, — a total length of 12.46 miles; and about 15.15 miles of miscellaneous surveys were made for roads to be constructed by towns.

Plans, profiles and cross-sections were plotted of surveys in 57 towns, representing a length of 68.13 miles.

Lay-out plans have been made of roads in 74 towns, of a

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total approximate length of 56.47 miles. Plans to accompany decrees for street railway locations on State roads and for provisional locations have been made in 13 towns. Plans and profiles have been made for work under the "small town" act in 28 towns.

Preliminary estimates in 100 towns, representing 94.23 miles, have been made; and also final estimates in 58 towns, representing 55.62 miles.

Tree Planting.

There have been planted along State roads during the past two years nearly 8,000 trees, at an approximate cost of $10,000. It was not thought best by the commission to begin this work until, as stated in last year's report, sufficient continuous stretches of State highway had been finished to enable it to inaugurate a complete system, to be extended each year. It was considered that a point had been reached last year when this could be done, and the work was begun in a systematic manner. During the past year the defects, or some of them, of the experimental stage were discovered, and as far as possible corrected. The attempt has been made to choose the best size of tree to plant, and to suit each tree to its environment when finally planted.

It is well known that a small tree, properly nourished, if transplanted, will outstrip in growth and health a tree that, at the time of transplanting, was much larger; and in answer to the criticism of the small dimensions of the trees planted by the commission, it should be said that the size determined on has been governed by what has appeared the best practice, without particular relation to the original cost of the tree. A careful inspection of each tree purchased has been made by the forester employed by the commission, and those individually defective have been thrown out. Greater care has been exercised in the preparation of the ground for the reception of the trees, for it was found that the extraordinary drought of last spring killed many trees, a part of which might well have been saved had such a contingency been anticipated.

It has been considered advisable to place all trees received from the nurserymen in the nursery established by the com-

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mission, so that they may get the added development of root fibers that tends to insure their future growth and strength. This makes two transplantings before the tree reaches its final location. The final setting should be made in most cases in the autumn. The cost of trees, transplanting, preparation of ground and final planting has been $1.01 per tree, as against $1.14 last year. The original cost for each tree was a little more last year, but a little more care has been given to the preparation of the ground.

The Legislature of last winter changed the law relating to trees along State highways, and placed the responsibility of caring for and preserving all trees within their limits upon the Highway Commission. The change is fully in accordance with the views of the commissioners, although a considerable added cost is involved; for not only must the roadside trees be cared for, but they must be protected against the attacks of all insect pests. The gypsy and brown-tail moths have become a menace to the entire State, and to arrest this nuisance every effort is required. It has become necessary for the commission to join with the cities and towns throughout the infested region; and, with the advice and assistance of Mr. A. H. Kirkland, the State superintendent for the suppression of these pests, contracts have been entered into by the commission with individuals or with the officials of the cities and towns, by which every State road within the district shall be freed from the nests of these pestiferous aliens.

The forester's report on tree planting for the year will be found in the appendix.

Automobile Registration.

The work in this department has been greater than in any previous year. The commission has felt that it was not more than fair to applicants for certificates of registration and licenses that they should receive their papers with as little delay as possible. The office force has been adjusted with this end in view, and at no time has the work been more than two days behind.

Approximately 4,000 letters have been received, and 5,000 letters have been written and sent out.

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Inasmuch as innumerable questions are received from local officials who are charged with the enforcement of the automobile law, it has been found necessary to make complete card indexes of all certificates and licenses. The indexes show quickly the owner's name from a numerical index, and the number of an automobile or motor cycle from an alphabetical index.

It is estimated that fully 15,000 persons have called during the year either for papers or for information.

The following tabulation shows the number of registration certificates and licenses to operate issued in the year 1905, and the amount of the fees received for the same: —

Certificates of registration: —			
Automobiles,	4,889 at	$2 00,	$9,778 00
Motor cycles,	533 at	2 00,	1,066 00
Manufacturers and dealers,	102 at	10 00,	1,020 00
Licenses to operate: —			
Ordinary operators,	3,736 at	2 00,	7,472 00
Professional chauffeurs (new),	2,392 at	2 00,	4,784 00
Professional chauffeurs (renewed),	741 at	50,	370 50
Total,			$24,490 50

Of number plates, 10,612, weighing in the aggregate about 6 tons, have been taken from their packing boxes and packed carefully in wrappers ready for delivery; 3,000 of such packages have been sent off by express.

Badges to the number of 3,133, for professional chauffeurs, have been delivered.

There have also been issued 300 certificates and licenses to replace that number lost, and records have been made of 1,500 transfers of ownership; and many hundred permits for temporary number plates have been issued.

Up to the present time the commissioners have heard 63 complaints for careless driving, and have suspended or revoked 6 licenses. Many informal complaints have been investigated.

Two hundred or more cautionary notices have been sent to persons charged with overspeeding.

Eight hundred and thirty-six cases, in which fines were imposed, have been reported by the courts. These reports are carefully filed and indexed, and notes made of persons with

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more than one conviction. In most instances where a person has been convicted more than once, a cautionary letter has been sent to him.

This part of the law has not been effective, inasmuch as all convictions have not been reported, and the names and addresses have been so carelessly reported that it is impossible to locate the person complained of. In many instances the owner of the automobile has paid the fine, when another has operated it. This has caused an endless number of useless letters and interviews, but it cannot be remedied as long as a person is willing to be punished for offences of another.

The present law instructs the Highway Commission to "issue to the applicant a certificate of registration, containing the name, place of residence and address of the applicant, and the general distinguishing number or mark assigned to him, and made in such form and containing such further provisions as said commission may determine."

If this act authorizes the Highway Commission to make regulations, said regulations must be printed on the certificate of registration. It is a cumbersome method. The certificate is a permit which cannot be annulled. New regulations of the commission might be made, and the result would be a want of harmony, as certificates of different dates would contain different regulations.

The commissioners have much difficulty in identifying the operator of an automobile showing a manufacturer's or dealer's number, as many cars carry the same number. If the commissioners were authorized to make regulations, this could easily be remedied by prefixing a series of letters to the numbers, and the keeping of a record by the owner of each machine when it is out.

After a year's trial of chapter 366, Acts of 1905, the Highway Commission is satisfied that it is defective. Twelve hearings have been given in towns where the selectmen have made special regulations as to speed, and a proper protest has been filed. In almost every instance where these special speed regulations have been passed the commissioners have found that no effort was made to enforce the State speed. The commissioners are firmly of the belief that no changes in speed regu-

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lations should be permitted by local authorities without the approval of the Highway Commission.

Unfortunately, local authorities have not reported as many serious offences against the law to the commissioners for their action as they might have done. This part of the law does not seem to be fully understood. The commissioners believe that the suspension or revocation of licenses is the most effective way of correcting flagrant breaches of the law, and that when it is taken advantage of to its fullest extent the problem will be solved.

Engineers and Clerks.

The engineering work of the commission during the past year has been under the general direction of Mr. Austin B. Fletcher, secretary of the board.

Messrs. Andrew M. Lovis and Sidney A. Parsons, first and second assistant engineers, respectively, have had charge of the surveying parties and of the office engineering work.

Messrs. William R. Farrington, John A. Johnston, Frank H. Joyner, Franklin C. Pillsbury and Warren B. Wheeler, division engineers, have had charge of construction work in the field.

The following men have been employed as resident engineers of the first class: Albert D. Dadley, Percival H. Everett, Lyman L. Gerry, Howard C. Holden, Charles H. Howes, Everell J. Nichols, Hiram D. Phillips and George R. Winslow.

The following men have been employed as resident engineers of the second class: George R. Brown, Martin W. Fisher, William P. Hammersley, Frank H. Morris, Carl A. Raymond (7 months), C. Alden Welton, Wilbur T. Wilson (9 months) and David H. Winslow.

The following men have been employed as resident engineers of the third class: Messrs. William G. Addis (9 months), George W. Bagge (4½ months), Daniel H. Dickinson (9 months), Arthur C. Downs (9 months), Stephen Litchfield, Jr. (8½ months), George D. Marshall (8 months) and Charles H. Norton.

The following men have been employed on survey work: chiefs of party: Messrs. Emory N. Colburn, David W. Merrill (6½ months), Harold R. Starbird and Fred M. Stuart.

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Transitmen: Arthur L. Bridgham (1 month), William S. Rhodes (3½ months), Warren H. Small (2 months), William M. Stodder (7 months) and Nathan B. Wilbur (5½ months). Rodmen: Abram N. Ashline (9 months), Milton J. Adams (8 months), James W. Arey (4 months), Emory S. Bingham (9 months), Henry W. Brown (23 days), William G. Burns, Robert F. Luce (3 months), Nahum A. Maynard (6 months) and Arthur Weston (2 months).

The following men have been employed as draughtsmen and office assistants: Messrs. C. Ridgely Brown, Fred H. Cunningham, Myron B. Hoyt (7½ months), Arthur Larrabee, Louis T. C. Loring (9 months), Albert L. Southworth, James H. Taylor, Charles S. Tinkham, Robert A. Vesper (6 months) and William N. Wade.

Mr. Elting J. O'Hara has had charge of the work in the automobile department, under the direction of the secretary, and the following clerks have also been employed in the department during the past year: Helen C. Bridge (4 months, 22 days), Elizabeth M. Connell (1 month, 23 days), Hannah F. Dowd (7 months, 19 days), Inez M. Felt (5 months, 2 days), Ida M. Lynam (2 months, 28 days), Caroline W. Perry (9 days), Ida L. Poore (8 months, 5 days), Irving L. Redfield (5 months, 24 days), Lillian J. Stearns (5 months), Frank F. Wyckoff (5 months, 23 days), Carl J. Youngren (8 months, 20 days) and George F. Murdock, messenger.

The regular clerical force remains as last reported, the list being as follows: John M. McCarthy, assistant to the secretary; Mary A. Riley and Nellie M. Barlow, stenographers; Edward A. Austin, accountant; Alice M. Worthen, copyist; and Fred Fair, clerk.

Mr. George E. Rayner has continued in the employ of the commission as inspector of the road-building machinery.

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Expenditures.

The following is a summary of the expenditures of the Massachusetts Highway Commission from Dec. 1, 1904, to Nov. 30, 1905 : —

Construction Expenditures.

Town or City.	Year of Lay-out.	Amount.	Totals.
Barnstable County.			
Barnstable,	1905	$3,324 42	
Bourne,	1903	9 97	
Bourne,	1905	3,311 95	
Brewster,	1895	197 20	
Brewster,	1896	197 20	
Brewster,	1897	197 21	
Chatham,	1902	8 71	
Chatham,	1905	7,252 49	
Dennis,	1895	76 44	
Dennis,	1896	76 45	
Dennis,	1897	76 44	
Dennis,	1898	76 44	
Eastham,	1904	913 89	
Eastham,	1905	1,876 92	
Falmouth,	1904	1,869 22	
Falmouth (1st),	1905	4,497 35	
Falmouth (2d),	1905	1,558 84	
Orleans (Eastham),	1904	1,009 16	
Orleans (Pleasant Bay),	1904	49 27	
Orleans,	1905	2,273 87	
Wellfleet,	1904	3,474 89	
Yarmouth,	1894	11 20	
Yarmouth,	1895	11 20	
Yarmouth (1st),	1896	11 20	
Yarmouth (2d),	1896	11 20	
Yarmouth (south),	1896	22 16	
			$32,395 29
Berkshire County.			
Becket,	1904	$828 60	
Becket,	1905	3,858 86	
Clarksburg,	1905	4,610 27	
Dalton,	1904	10 83	
Great Barrington,	1894	1,398 37	
Great Barrington,	1896	1,398 38	
Hinsdale,	1903	4 43	
Lee,	1900	33 75	
Lenox,	1904	7,735 26	
Lenox,	1905	1,841 81	
North Adams,	1903	3 74	
Pittsfield,	1894	1,135 03	
Pittsfield,	1898	1,135 03	
Pittsfield,	1904	1,228 86	
Amounts carried forward,		$25,222 22	$32,395 29

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CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals
Amounts brought forward,		$25,222 22	$32,395 29
Pittsfield,	1905	3,422 39	
Richmond,	1897	20 82	
Richmond,	1898	20 82	
Richmond,	1899	20 83	
Richmond,	1901	20 83	
Richmond,	1902	20 83	
Richmond,	1903	20 83	
Richmond,	1904	25 13	
Richmond,	1905	2,061 81	
Stockbridge,	1905	3,690 31	
			34,547 82
Bristol County.			
Attleborough,	1901	$6,537 16	
Dartmouth,	1903	5,421 50	
Dartmouth,	1905	4,695 76	
Fairhaven,	1894	1,691 39	
Fairhaven,	1895	845 69	
Rehoboth,	1905	4,714 32	
Seekonk,	1904	159 65	
Somerset,	1904	1,317 01	
Somerset,	1905	4,203 10	
Taunton,	1905	5,937 12	
Westport,	1894	2,726 43	
			38,249 13
Dukes County.			
Chilmark,	1905	$5,468 27	
Chilmark,	–	222 63	
West Tisbury (1st),	1904	3,370 54	
West Tisbury (2d),	1904	438 14	
			9,499 58
Essex County.			
Amesbury,	1903	$221 61	
Andover,	1895	28 62	
Andover,	1896	28 63	
Andover,	1897	28 64	
Andover,	1899	28 64	
Andover,	1900	28 64	
Andover,	1902	28 64	
Andover,	1903	28 64	
Beverly (1st),	1905	4,171 66	
Beverly (2d),	1905	1,656 03	
Beverly (3d),	1905	443 22	
Essex,	1902	38 06	
Gloucester,	1905	3,516 32	
Groveland,	1905	922 21	
Haverhill,	1904	554 07	
Merrimac,	1903	27 70	
Newbury,	1904	940 50	
Amounts carried forward,		$12,691 83	$114,691 82

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CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals.
Amounts brought forward,		$12,691 83	$114,691 82
Newbury,	1905	4,877 46	
Rowley,	1905	860 73	
Salem,	1901	227 91	
Salisbury,	1904	3,119 11	
Salisbury,	1905	3,757 70	
Swampscott,	1897	2,304 44	
West Newbury,	1904–5	1,057 79	
			28,896 97
Franklin County.			
Colrain,	1905	$2,983 41	
Deerfield,	1904	4,826 74	
Deerfield,	1905	3,795 31	
Erving,	1898	4,152 34	
Greenfield,	1905	1,008 36	
Montague,	1904	696 13	
Montague,	1905	11 63	
Orange,	1905	844 49	
Sunderland,	1904	2,943 88	
Whately,	1905	4,242 72	
			25,505 01
Hampden County.			
Brimfield,	1899	$26 79	
Chester,	1904	600 11	
Chester,	1905	6,616 97	
Chicopee,	1905	4,957 98	
Monson,	1901	14 42	
Monson,	1905	2,550 80	
Palmer,	1901	65 67	
Palmer,	1905	4,256 95	
Russell,	1894	4 76	
Westfield,	1899	113 08	
Westfield,	1900	113 09	
Westfield,	1901	113 09	
Westfield,	1902	115 53	
West Springfield,	1905	2,920 08	
Wilbraham,	1904	3,286 22	
			25,755 54
Hampshire County.			
Granby,	1905	$6,144 20	
Hadley,	1895	4,400 24	
Hadley,	1904	291 40	
Huntington,	1895	4 76	
Northampton (1st),	1905	9,349 10	
Northampton (2d),	1905	3,709 60	
South Hadley,	1903	79 83	
South Hadley,	1904	664 22	
Southampton,	1905	4,216 96	
			28,860 31
Amount carried forward,			$223,709 65

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CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals.
Amount brought forward,			$223,709 65
Middlesex County.			
Ashby,	1894	$8 80	
Ashby,	1895	8 79	
Ashby,	1896	8 80	
Ashby,	1897	8 80	
Ashby,	1898	8 81	
Ashby,	1899	8 81	
Ashland,	1903	4 43	
Boxborough,	1905	2,391 19	
Burlington,	1904	816 27	
Burlington,	1905	5,021 72	
Chelmsford,	1901	277 03	
Chelmsford,	1904	1,558 31	
Concord,	1905	6,362 82	
Concord (bridge),	1905	5,714 44	
Dracut,	1905	111 67	
Framingham,	1904	4,325 52	
Framingham,	1905	4,640 69	
Littleton,	1904	947 62	
Marlborough,	1904	676 22	
Natick,	1901	77 59	
Natick,	1903	2,065 18	
North Reading,	1897	36 72	
North Reading,	1898	36 71	
North Reading,	1901	36 72	
North Reading,	1904	34 95	
North Reading (bridge),	1904	2,315 26	
Reading,	1899	65 35	
Reading,	1900	65 35	
Reading,	1902	65 35	
Reading,	1904	90 13	
Reading (bridge),	1904	2,315 27	
Stoneham,	1897	35 75	
Stoneham,	1898	35 75	
Stoneham,	1900	35 76	
Stoneham,	1901	35 77	
Tewksbury,	1904	3,092 41	
Tewksbury,	1905	6,242 13	
Townsend,	1896	11 34	
Townsend,	1897	1,207 46	
Townsend,	1898	505 21	
Townsend,	1900	22 88	
Townsend,	1901	11 24	
Townsend,	1902	11 24	
Westford,	1903	63 81	
Weston,	1899	326 34	
Winchester,	1899	207 26	
			51,949 67
Amount carried forward,			$275,659 32

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CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals.
Amount brought forward,			$275,659 32
Norfolk County.			
Bellingham,	1904	$4,828 70	
Bellingham,	1905	215 14	
Braintree,	1902	476 22	
Canton,	1905	676 46	
Dover,	1905	3,647 46	
Foxborough,	1905	4,939 82	
Franklin,	1905	5,102 48	
Milton,	1899	1,142 80	
Needham,	1905	3,852 88	
Norfolk,	1895	60 89	
Norwood,	1895	34 89	
Norwood,	1896	34 88	
Norwood,	1897	34 88	
Norwood,	1899	34 88	
Quincy,	1904	5,950 41	
Stoughton,	1904	520 81	
Stoughton,	1905	6,631 30	
Walpole,	1894	26 87	
Walpole,	1895	26 87	
Walpole,	1897	26 87	
Walpole,	1898	26 88	
Walpole,	1900	26 88	
Wellesley,	1901	32 91	
Westwood,	1899	59 37	
Weymouth,	1903	1,264 35	
Weymouth,	1904	682 10	
Wrentham,	1897	24 66	
Wrentham,	1898	24 65	
Wrentham,	1902	24 65	
			40,431 96
Plymouth County.			
Abington,	1905	$3,048 40	
Bridgewater,	1905	4,579 10	
Duxbury,	1903	18 91	
Duxbury,	1905	4,777 18	
Kingston,	1905	47 24	
Marion,	1903	475 43	
Pembroke,	1905	2,255 59	
Plymouth,	1904	4,250 38	
Rochester,	1903	1,957 88	
Rockland,	1905	3,944 73	
Wareham,	1905	124 98	
West Bridgewater,	1904	221 62	
			25,701 44
Suffolk County.			
Chelsea,	1901	$4,923 57	
			4,923 57
Amount carried forward,			$346,716 29

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CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals.
Amount brought forward,			$346,716 29
Worcester County.			
Athol,	1895	$33 36	
Athol,	1896	33 37	
Auburn,	1895	3,540 44	
Auburn,	1896	2,569 00	
Auburn,	1897	2,744 74	
Auburn,	1898	20 67	
Auburn,	1899	20 67	
Auburn,	1901	20 67	
Auburn,	1904	2,079 37	
Auburn,	1903	8,013 41	
Brookfield,	1897	30 18	
Brookfield,	1898	30 18	
Brookfield,	1900	30 18	
Brookfield,	1902	30 18	
Brookfield,	1903	30 19	
Brookfield (1st),	1905	7,090 77	
Brookfield (2d),	1905	4,049 31	
Charlton,	1905	3,134 80	
Douglas,	1904	1,199 05	
Douglas (bridge),	1904	783 68	
Douglas,	1905	2,378 24	
Dudley,	1904	1,108 77	
Fitchburg,	1894	12 95	
Fitchburg,	1895	12 95	
Fitchburg,	1903	8 09	
Fitchburg,	1904	4,119 53	
Gardner,	1897	110 68	
Gardner,	1898	110 68	
Grafton,	1905	3,501 56	
Harvard,	1905	9,025 00	
Holden,	1905	3,846 44	
Lancaster,	1902	797 36	
Leicester,	1896	5 04	
Leicester,	1898	5 04	
Leicester,	1899	5 05	
Leominster,	1904	67 18	
Leominster,	1905	2 49	
Milford,	1904	6,167 13	
Milford,	1905	3,257 97	
Millbury,	1904	354 68	
Northborough,	1904	1,213 41	
North Brookfield,	1905	2,920 97	
Phillipston,	1904	5,248 17	
Princeton,	1897	20 08	
Princeton,	1900	20 09	
Princeton,	1902	20 09	
Princeton,	1903	20 09	
Amounts carried forward,		$79,843 95	$346,716 29

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CONSTRUCTION EXPENDITURES — *Concluded.*

TOWN OR CITY.	Year of Lay-out.	Amount.	Totals.
Amounts brought forward, . . .		$79,843 95	$346,716 29
Rutland, ...	1904	8,484 81	
Shrewsbury, ...	1898	409 57	
Shrewsbury, ...	1904	2,018 36	
Southborough, ...	1903	98 59	
Southborough, ...	1905	72 58	
Spencer, ...	1899	3 44	
Spencer (1st), ...	1900	3 44	
Spencer (2d), ...	1900	3 45	
Sterling, ...	1905	3,189 42	
Sturbridge, ...	1897	2,351 49	
Sturbridge, ...	1903–4	8,106 49	
Sutton, ...	1904	252 09	
Templeton, ...	1899	24 74	
Templeton, ...	1901	24 73	
Templeton, ...	1902	24 73	
Templeton, ...	1903	24 73	
Templeton, ...	1905	2,518 67	
Westborough, ...	1903	339 53	
West Brookfield, ...	1899	30 25	
West Brookfield, ...	1900	30 25	
West Brookfield, ...	1901	30 26	
West Brookfield, ...	1905	4,726 98	
Westminster, ...	1894	8 63	
Westminster, ...	1895	8 63	
Westminster, ...	1896	8 62	
Westminster, ...	1897	8 62	
Westminster, ...	1898	8 62	
Westminster, ...	1899	8 63	
Westminster, ...	1903	82 26	
Worcester, ...	1900	3 60	
Worcester, ...	1905	5,919 50	
			118,669 66
			$465,385 95

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REPAIR AND MAINTENANCE EXPENDITURES.

[Under chapter 316 of the Acts of 1904 and chapter 36 of the Acts of 1905.]

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Barnstable County.				
Barnstable,	$13 88	$322 93	$336 81	
Bourne,	–	119 56	119 56	
Brewster,	19 34	788 25	807 59	
Chatham,	–	152 80	152 80	
Dennis,	27 19	457 04	484 23	
Eastham,	–	326 04	326 04	
Falmouth,	–	190 79	190 79	
Harwich,	12 46	425 69	438 15	
Orleans,	–	158 10	158 10	
Provincetown,	18 00	62 77	80 77	
Sandwich,	–	1,588 28	1,588 28	
Truro,	14 10	269 85	283 95	
Wellfleet,	–	429 00	429 00	
Yarmouth (north),	19 07	277 05	296 12	
Yarmouth (south),	295 17	422 73	717 90	
	$419 21	$5,990 88	$6,410 09	$6,410 09
Berkshire County.				
Adams,	–	$27 96	$27 96	
Becket,	–	150 11	150 11	
Cheshire,	–	180 99	180 99	
Dalton,	–	395 39	395 39	
Great Barrington,	$286 60	887 38	1,173 98	
Hancock,	21 75	740 25	762 00	
Hinsdale,	–	33 18	33 18	
Lee,	72 85	820 01	892 86	
Lenox,	65 00	399 64	464 64	
North Adams,	40 37	4,692 41	4,732 78	
Pittsfield,	–	674 80	674 80	
Richmond,	–	337 46	337 46	
Stockbridge,	–	3 53	3 53	
Williamstown,	339 07	463 68	802 75	
Windsor,	–	72 59	72 59	
	$825 64	$9,879 38	$10,705 02	10,705 02
Bristol County.				
Acushnet,	–	$163 22	$163 22	
Attleborough,	$110 66	102 62	213 28	
Dartmouth,	–	37 80	37 80	
Dighton,	–	20 54	20 54	
Easton,	3 33	26 84	30 17	
Fairhaven,	40 95	18 62	59 57	
Freetown,	–	74 47	74 47	
Mansfield,	–	33 70	33 70	
North Attleborough,	19 23	230 80	250 03	
Am'ts carried for'd,	$174 17	$708 61	$882 78	$17,115 11

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REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Am'ts brought for'd,	$174 17	$708 61	$882 78	$17,115 11
Norton,	–	26 61	26 61	
Raynham,	–	14 17	14 17	
Rehoboth,	–	150 57	150 57	
Seekonk,	–	48 01	48 01	
Somerset,	6 50	365 20	371 70	
Swansea,	7 00	18 33	25 33	
Taunton,	57 06	81 56	138 62	
Westport,	–	282 71	282 71	
	$244 73	$1,695 77	$1,940 50	1,940 50
Dukes County.				
Chilmark,	–	$7 28	$7 28	
Cottage City,	$9 88	161 26	171 14	
Edgartown,	8 58	121 09	129 67	
Tisbury,	9 39	133 67	143 06	
West Tisbury,	14 38	231 81	246 19	
	$42 23	$655 11	$697 34	697 34
Essex County.				
Amesbury,	$47 70	$182 18	$229 88	
Andover,	7 09	278 77	285 86	
Beverly,	477 04	2,000 87	2,477 91	
Essex,	–	100 57	100 57	
Gloucester,	28 90	244 05	272 95	
Groveland,	42 53	53 29	95 82	
Hamilton,	–	132 29	132 29	
Haverhill,	15 89	117 48	133 37	
Lawrence,	3 88	28 36	32 24	
Lynn,	–	5 04	5 04	
Merrimac,	34 36	118 91	153 27	
Methuen,	8 25	68 41	76 66	
Newbury,	–	172 10	172 10	
Newburyport,	–	80 78	80 78	
North Andover,	–	198 16	198 16	
Rockport,	–	2 06	2 06	
Salem,	–	85	85	
Salisbury,	–	9 30	9 30	
Saugus,	89 75	314 68	404 43	
Swampscott,	128 90	158 43	287 33	
Wenham,	50 49	153 55	204 04	
West Newbury,	–	241 55	241 55	
	$934 78	$4,661 68	$5,596 46	5,596 46
Franklin County.				
Ashfield,	$2 50	$286 83	$289 33	
Buckland,	135 89	485 37	621 26	
Charlemont,	33 35	123 64	156 99	
Am'ts carried for'd,	$171 74	$895 84	$1,067 58	$25,349 41

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REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Am'ts brought for'd, .	$171 74	$895 84	$1,067 58	$25,349 41
Colrain, ...	8 81	242 93	251 74	
Deerfield, ...	–	266 86	266 86	
Erving, ...	21 70	101 84	123 54	
Greenfield, ...	1 65	138 97	140 62	
Montague, ...	–	254 09	254 09	
Northfield, ...	–	61 03	61 03	
Orange, ...	78 90	275 39	354 29	
Shelburne, ...	13 67	312 81	326 48	
Sunderland, ...	–	272 90	272 90	
Whately, ...	24 00	86 70	110 70	
	$320 47	$2,909 36	$3,229 83	3,229 83
Hampden County.				
Agawam, ...	–	$11 24	$11 24	
Brimfield, ...	$74 79	199 90	274 69	
Chester, ...	20 10	264 60	284 70	
Chicopee, ...	34 06	2,908 24	2,942 30	
East Longmeadow, . .	13 25	4 81	18 06	
Monson, ...	21 90	94 62	116 52	
Palmer, ...	50 16	185 78	235 94	
Russell, ...	21 55	374 70	396 25	
Wales, ...	43 53	28 16	71 69	
Westfield, ...	–	1,622 28	1,622 28	
West Springfield, . .	–	67 84	67 84	
Wilbraham, . . .	37 42	240 93	278 35	
	$316 76	$6,003 10	$6,319 86	6,319 86
Hampshire County.				
Amherst, ...	$19 13	$193 32	$212 45	
Belchertown, . . .	–	169 38	169 38	
Easthampton, . . .	–	162 08	162 08	
Goshen, ...	228 63	141 28	369 91	
Granby, ...	2 00	417 78	419 78	
Hadley, ...	–	423 41	423 41	
Hatfield, ...	–	14 40	14 40	
Huntington, . . .	–	178 54	178 54	
Northampton, . . .	–	145 79	145 79	
Southampton, . . .	–	4 23	4 23	
South Hadley, . . .	85 02	677 13	762 15	
Ware, ...	1 75	74 06	75 81	
Williamsburg, . . .	19 40	115 75	135 15	
	$355 93	$2,717 15	$3,073 08	3,073 08
Middlesex County.				
Acton, ...	$37 40	$206 75	$244 15	
Ashby, ...	79 27	295 09	374 36	
Ashland, ...	6 01	43 09	49 10	
Am'ts carried for'd, .	$122 68	$544 93	$667 61	$37,972 18

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REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Am'ts brought for'd, .	$122 68	$544 93	$667 61	$37,972 18
Bedford, ...	11 20	43 35	54 55	
Boxborough, . . .	–	71 57	71 57	
Burlington, . . .	14 87	116 25	131 12	
Chelmsford, . . .	–	169 58	169 58	
Concord, ...	6 00	135 26	141 26	
Groton, ...	1 50	92 55	94 05	
Lexington, . . .	16 54	281 14	297 68	
Lincoln, ...	9 91	230 59	240 50	
Littleton, ...	6 50	112 58	119 08	
Lowell (north), . .	–	73 27	73 27	
Lowell (south), . .	–	269 85	269 85	
Marlborough, . . .	29 90	113 07	142 97	
Natick, ...	–	79 75	79 75	
Newton, ...	–	6 63	6 63	
North Reading, . .	24 63	117 49	142 12	
Reading, ...	3 21	228 32	231 53	
Stoneham, . . .	–	176 24	176 24	
Sudbury, ...	83 00	377 55	460 55	
Tewksbury, . . .	3 23	169 65	172 88	
Townsend, . . .	89 89	233 79	323 68	
Tyngsborough, . .	9 20	123 47	132 67	
Watertown, . . .	7 20	72 42	79 62	
Wayland, ...	183 38	134 09	317 47	
Westford, ...	15 00	281 44	296 44	
Weston, ...	115 84	47 80	163 64	
Winchester, . . .	46 12	286 79	332 91	
Woburn, ...	73 62	221 88	295 50	
	$873 42	$4,811 30	$5,684 72	5,684 72
Nantucket County.				
Nantucket, . . .	$27 00	$383 74	$410 74	410 74
Norfolk County.				
Bellingham, . . .	–	$10 20	$10 20	
Braintree, ...	–	27 82	27 82	
Cohasset, ...	–	64 19	64 19	
Foxborough, . . .	–	72 78	72 78	
Holbrook, ...	$7 29	51 57	58 86	
Milton, ...	–	574 87	574 87	
Needham, ...	–	6 39	6 39	
Norfolk, ...	33 10	20 98	54 08	
Norwood, ...	33 29	214 39	247 68	
Plainville, . . .	–	29 88	29 88	
Quincy, ...	–	27 48	27 48	
Randolph, . . .	–	97 99	97 99	
Stoughton, . . .	29 95	64 84	94 79	
Walpole, ...	25 83	168 58	194 41	
Am'ts carried for'd, .	$129 46	$1,431 96	$1,561 42	$44,067 64

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REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Am'ts brought for'd, .	$129 46	$1,431 96	$1,561 42	$44,067 64
Wellesley, . . .	–	69 58	69 58	
Westwood, . . .	–	66 71	66 71	
Weymouth, . . .	1 04	114 40	115 44	
Wrentham, . . .	234 85	144 97	379 82	
	$365 35	$1,827 62	$2,192 97	2,192 97
Plymouth County.				
Abington, . . .	$4 92	$64 72	$69 64	
Bridgewater, . . .	–	17 20	17 20	
Brockton, . . .	10 54	158 13	168 67	
Duxbury, . . .	–	198 99	198 99	
Hingham, . . .	–	143 35	143 35	
Lakeville, . . .	–	89 28	89 28	
Marion, . . .	–	186 92	186 92	
Marshfield, . . .	–	163 39	163 39	
Mattapoisett, . . .	–	83 29	83 29	
Middleborough, . .	–	155 57	155 57	
Plymouth, . . .	226 60	126 26	352 86	
Rochester, . . .	–	114 35	114 35	
Rockland, . . .	–	10 94	10 94	
Scituate, . . .	41 50	133 73	175 23	
Wareham, . . .	–	506 42	506 42	
West Bridgewater, .	11 42	78 06	89 48	
Whitman, . . .	7 08	61 77	68 85	
	$302 06	$2,292 37	$2,594 43	2,594 43
Suffolk County.				
Chelsea, . . .	–	$3 72	$3 72	
Revere (east), . .	$31 68	146 27	177 95	
Revere (west), . .	59 63	204 16	263 79	
	$91 31	$354 15	$445 46	445 46
Worcester County.				
Athol, ...	$1 00	$237 39	$238 39	
Auburn, ...	–	357 90	357 90	
Barre, ...	22 53	134 34	156 87	
Blackstone, . . .	12 50	141 46	153 96	
Brookfield, . . .	40 20	178 81	219 01	
Charlton, . . .	65 39	104 04	169 43	
Douglas, ...	220 20	18 48	238 68	
Dudley, ...	19 30	187 12	206 42	
Fitchburg, . . .	49 20	1,396 34	1,445 54	
Gardner, ...	34 25	514 89	549 14	
Grafton, ...	28 40	27 40	55 80	
Hardwick, . . .	–	69 72	69 72	
Harvard, ...	4 28	116 76	121 04	
Holden, ...	7 50	95 21	102 71	
Am'ts carried for'd, .	$504 75	$3,579 86	$4,084 61	$49,300 50

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REPAIR AND MAINTENANCE EXPENDITURES — *Concluded.*

TOWN OR CITY.	PAID FROM REVENUE.		Amount.	Totals.
	Chapter 316.	Chapter 36.		
Am'ts brought for'd, .	$504 75	$3,579 86	$4,084 61	$19,300 50
Lancaster, . . .	–	56 58	56 58	
Leicester, . . .	12 89	318 83	331 72	
Leominster, . . .	–	132 01	132 01	
Lunenburg, . . .	2 00	286 20	288 20	
Millbury, . . .	2 24	105 49	107 73	
New Braintree, . .	–	46 06	46 06	
Northborough, . .	5 56	129 03	134 59	
Paxton, . . .	19 57	86 24	105 81	
Phillipston, . . .	1 00	47 53	48 53	
Princeton, . . .	–	44 37	44 37	
Rutland, . . .	–	7 45	7 45	
Shrewsbury, . . .	49 55	206 99	256 54	
Southborough, . .	–	7 20	7 20	
Southbridge, . . .	2 57	31 45	34 02	
Spencer, . . .	–	68 74	68 74	
Sterling, . . .	29	133 89	134 18	
Sturbridge, . . .	4 63	8 86	13 49	
Sutton, . . .	70 19	103 90	174 09	
Templeton, . . .	2 00	98 25	100 25	
Uxbridge, . . .	–	83 61	83 61	
Warren, . . .	–	315 19	315 19	
Westborough, . .	–	45 13	45 13	
West Boylston, . .	–	334 52	334 52	
West Brookfield, . .	16 15	110 54	126 69	
Westminster, . . .	132 97	763 80	896 77	
Worcester, . . .	8 86	168 46	177 32	
Totals, . . .	$835 22	$7,320 18	$8,155 40	$8,155 40

EXPENDITURES UNDER "SMALL TOWN" ACTS.

[Chapter 47, Revised Laws.]

Alford, ...	$176 00
Ashburnham, ...	640 00
Avon, ...	443 00
Ayer, ...	1,000 00
Billerica, ...	900 00
Boylston, ...	520 00
Carver, ...	1,448 00
Chesterfield, ...	100 00
East Bridgewater, ...	442 89
Egremont, ...	536 00
Enfield, ...	600 00
Amount carried forward, ...	$6,805 89

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Amount brought forward,	$6,805 89
Georgetown (two contracts),	562 50
Granville,	845 39
Greenwich,	180 00
Halifax,	702 00
Hampden,	428 00
Hanover,	2,048 82
Hawley,	444 00
Hubbardston,	840 00
Lanesborough (two contracts),	552 00
Leverett,	952 00
Leyden,	204 00
Longmeadow,	1,050 00
Maynard,	1,400 00
Mendon,	400 00
Millis,	944 81
Montgomery,	408 00
New Marlborough,	1,024 00
Otis,	496 00
Pembroke,	55 00
Peru,	296 00
Petersham,	1,020 00
Plympton,	310 00
Prescott,	372 00
Provincetown,	1,257 56
Rowe,	432 00
Sandisfield,	756 00
Savoy,	616 00
Sherborn,	200 00
Shirley,	856 00
Southwick,	600 00
Shutesbury (two contracts),	642 00
Stow,	644 38
Topsfield,	744 00
Tyringham,	704 00
Westhampton,	452 00
Winchendon,	295 25
Worthington,	730 00
Total,	$31,269 60

EXPENDITURES UNDER CHAPTER 100, RESOLVES OF 1904.

Road Repair at Middlefield.

Payments for work under contract at Middlefield,	$35 92

EXPENDITURES UNDER CHAPTER 384, ACTS OF 1903.

Lynn State Highway Construction.

Payments for work done under contract at Lynn,	$43,621 21

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General Expenses.

For Month of December, 1904.

[Under Chapter 19, Acts of 1904.]

Salaries of commissioners,	$708 35	
Travel of commissioners,	60 40	
Salaries of clerical assistants and first and second assistant engineers,	1,089 00	
Printing and postage,	12 00	
Rent of offices,	1,062 51	
Advertising hearings,	7 38	
Recording land takings and easements,	4 35	
Steam road roller, repairs to,	30 37	
Miscellaneous items, including office supplies, express charges, telegrams and minor office expenses,	23 25	
		$2,997 61
Automobile registration: —		
Salaries of clerks and clerical assistants,	$299 00	
Badges for professional chauffeurs,	75	
Printing, including postal cards and envelopes,	23 76	
Sheriff's services in notices for hearings,	20 54	
Miscellaneous items,	55	
		344 60
		$3,342 21

Jan. 1 to Nov. 30, 1905.

[Under Chapter 36, Acts of 1905.]

Salaries of commissioners,	$7,791 65	
Travel of commissioners,	2,575 26	
Salaries of clerical assistants and first and second assistant engineers,	11,909 88	
Rent of offices,	3,760 42	
Printing and binding annual report,	1,089 15	
Office and typewriter supplies,	482 88	
Printing, including postal cards and envelopes,	1,270 17	
Telephone, including tolls,	342 38	
Postage,	182 50	
Recording land takings and easements,	163 05	
Advertising hearings,	52 61	
Repairs to steam road rollers,	2,862 41	
Miscellaneous items, including express charges, car fares, telegrams and other minor office expenses,	408 23	
		$32,890 59
Automobile registration: —		
Salaries of clerks and clerical assistants,	$4,734 53	
Travel and expense,	24 00	
Number plates for registering automobiles,	1,550 00	
Amounts carried forward,	$6,308 53	$32,890 59

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Amounts brought forward,	$6,308 53	$32,890 59
Badges for professional chauffeurs,	712 50	
Office and typewriter supplies,	228 71	
Printing, including postal cards and envelopes,	1,165 01	
Postage,	44 00	
Sign boards and supplies,	171 43	
Rent of offices,	529 16	
Miscellaneous items, including express charges, telegrams, car fares, due stamps and other minor office expenses,	152 50	
		9,311 84
		$42,202 43

EXPENDITURES FROM REVENUE, BY DEFICIENCY APPROPRIATION.

[Chapter 125, Acts of 1905.]

Travel and expense of commission,	$41 60
Printing, including postal cards and envelopes,	192 44
Advertising hearings,	7 22
Office and typewriter supplies,	34 98
Telephone tolls,	2 10
Miscellaneous items,	20 25
	$298 59

SUMMARY OF EXPENDITURES

For construction,	$465,385 95
For road repair and maintenance,	57,455 90
For construction under "small town" acts,	31,269 60
For construction under chapter 100, Resolves of 1904,	35 92
For construction under chapter 384, Acts of 1903,	43,621 21
For general expenses, including automobile registration, chapter 19, Acts of 1904,	3,342 21
For general expenses, including automobile registration, chapter 36, Acts of 1905,	42,202 43
For expenditures under deficiency appropriation,	298 59
	$643,611 81

W. E. McCLINTOCK,
HAROLD PARKER,
JOHN H. MANNING,
Massachusetts Highway Commission.

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APPENDIX.

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APPENDIX A.

TABLE SHOWING THE HIGHWAYS LAID OUT AND CONTRACTED CONSTRUCTIONS

[In the last column the capital letters have the following significance: A, trap; B, local field stone; F, gravel; G, gravel and four-inch macadam; H, screened gravel; K, clay and four.

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Abington,	1900-1-3,	Brockton line,
2	Abington,	1905,	Holbrook line,
3	Acton,[2]	1899-1900-1-2,	Concord line to Littleton line,
4	Acton (west),	1901,	Boxborough line,
5	Acushnet,	1901-3,	Rochester line via Long Plain to Rochester.
6	Acushnet,	1897,	1,500 feet from New Bedford line,
7	Adams,	1897,	Cheshire line,
8	Agawam,	1903-4,	South end bridge at Connecticut River.
9	Amesbury,	1899-1901-3-4,	Merrimac line,
10	Amherst,	1901-4,	Hadley line,
11	Andover,	1895-6,	Lawrence line,
12	Andover,	1897-9-1900-2-3,	North Reading line,
13	Ashby,	1894-5-6-7-8-9,	Fitchburg line to Ashby post-office,
14	Ashfield,	1897-8,	One mile north of Ashfield post-office.
15	Ashland,	1903,	Southborough line,
16	Athol,	1895-6,	Orange line,
17	Athol,	1902-3,	Phillipston line,
18	Attleborough,	1900-1-3,	North Attleborough line,
19	Auburn,	1895-6-7-8-9-1901-3-4,	Worcester line to Oxford line.
20	Barnstable (north),	1899-1902,	Sandwich line,
21	Barnstable (south),	1897-1901,	Yarmouth line,
22	Barnstable (west),	1904,	Marston Mills,
23	Barre,	1897-9-1900-2,	Ware River Bridge to Barre Common.
24	Becket,	1902-4,	Chester line,
25	Becket,	1905,	Westerly end of 1904 section,

[1] 1900 section. [2] Exclusive of 1,100 feet at railroad crossing. [3] 1899-1900 sections.

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APPENDIX A.

FOR BY THE COMMISSION, AND THE NATURE OF THE SEVERAL TO JAN. 1, 1906.

stone; C, local ledge other than trap; D, bottom course field stone, top course trap; E, lime. inch macadam; M, clay and screened gravel; N, unsurfaced; O, stone from Cohasset quarry.]

ROAD LAID OUT.		Length constructed Miles).	WIDTHS.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Easterly, . .	1.73	1.74	50–60	15	[1] 3	B.	1
Easterly, . .	.48	.48	40–50	15	–	B.	2
North-westerly,	3.71	3.71	50–50+	16	[2] 3	A–G.	3
South-easterly, .	.72	.72	50	15	–	A.	4
Westerly and northerly.	2.80	2.80	40	15	–	B.	5
Northerly, . .	.61	.61	50+	15	3	B.	6
Northerly, .	.57	.57	50	15	3	A.	7
Southerly, . .	1.15	1.15	50–60+	15	–	A.	8
Easterly, . .	2.24	2.24	50–55–60	15	[4] 3	B.	9
North-easterly, .	.97	.97	50	15	–	A.	10
Southerly, . .	1.22	1.22	66	18	3	D.	11
Northerly, .	2.98	2.98	60	15	[2] 3	B–C.	12
Northerly, .	3.58	3.58	50–66	30–18–15	5–3	B.	13
Northerly, .	1.61	1.61	50–70	–	–	H.	14
Easterly, . .	1.47	1.47	50+	–	–	F.	15
Easterly, . .	1.61	1.61	50	17	3	A–D.	16
North-westerly,	1.49	1.02	50	15	–	B.	17
South-westerly, .	2.66	2.66	66	[4] 18	–	A–F–G.	18
South-westerly,	5.26	5.26	50–50+	15–18	[4] 3	A–B–G.	19
South-easterly, .	2.14	2.00	40–50	15	–	1899–B, 1902–B–G.	20
Westerly, . .	2.26	2.26	40–62	12–15–18	–	B.	21
Southerly, .	1.48	1.48	40	15	–	B.	22
North-westerly,	2.89	2.89	49.5–50+	15	–	A, 1902–B.	23
Westerly, . .	1.07	1.07	50	12	–	A, 1904–N.	24
Westerly, . .	.54	.54	50	–	–	N.	25

[4] 1899 section. [5] 1897–99–1900 sections. [6] 1901 section.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Bedford,	1897-1902,	Lexington line,
2	Bedford,	1903,	Carlisle bridge,
3	Belchertown,	1900-1-2,	Near depot,
4	Bellingham,	1902,	900 feet from Blackstone line,
5	Bellingham,	1905,	Blackstone line,
6	Bellingham,	1904,	Franklin line,
7	Bellingham,	1905,	Westerly end of 1904 section,
8	Beverly,	1895-7-8,	Wenham line,
9	Beverly,	1905,	Manchester line,
10	Blackstone,	1899-1900-2,	Uxbridge line,
11	Blackstone,	1905,	Bellingham line to Woonsocket line.
12	Bourne,	1897-8-1904,	Cohasset Narrows,
13	Bourne,	1903,	Back River bridge,
14	Bourne,[4]	1905,	Southerly end of 1903 section,
15	Boxborough,	1897-9,	Acton line,
16	Boxborough,	1905,	Westerly end of 1899 section.
17	Braintree,	1900-2,	Quincy line,
18	Brewster,	1895-6-7-1901,	Dennis line to Orleans line,
19	Bridgewater,	1905,	Near Middleborough line,
20	Bridgewater,	1905,	Northerly end of 1904 section,
21	Brimfield,	1897-9,	Monson line,
22	Brimfield,	1901-2,	Wales line,
23	Brockton,	1897-8-9,	Easton line,
24	Brockton,	1900,	Abington line,
25	Brockton,	1904,	West Bridgewater line,
26	Brookfield,	1902-3,	West Brookfield line,
27	Brookfield,	1897-8-1900-4,	Brookfield village,
28	Brookfield,	1905,	Spencer line,
29	Buckland,	1894-5-6-7-8-9-1900-3,	Shelburne Falls station,
30	Burlington,	1903-4,	Woburn line,
31	Burlington,	1905,	Northerly end of 1904 section,
32	Canton,	1905,	Stoughton line,
33	Charlemont,	1897-8-9,	Deerfield River bridge,
34	Charlton,	1901-2,	Charlton depot to Charlton city,
35	Charlton,	1905,	Near Charlton city,
36	Chatham,	1899-1901-2,	Depot street,

[1] 1897 section. [2] 1899 section. [3] 1897-8 sections.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
North-westerly,	1.07	1.07	50–60	15	[4] 3	B.	1
Southerly,	.04	.04	50	–	–	N.	2
Westerly,	1.37	1.37	50	15	–	A–G.	3
North-easterly,	.38	.38	50	15	–	B.	4
North-easterly,	.73	.35	35–50	15	–	B.	5
Westerly,	.98	.98	50–66	15	–	B.	6
Westerly,	.17	–	50±	–	–	–	7
Southerly,	2.01	2.01	50–60	18	3	1895–7 A, 1898 C.	8
South-westerly,	2.90	2.90	27–60	15–18	–	A.	9
South-easterly,	1.74	1.74	49.5–50+	15	[4] 3	A–G.	10
South-westerly,	.06	-	42–46	-	-	-	11
Easterly,	2.09	2.09	40–45+	15	[4] 3	B–C–O.	12
Southerly,	.96	.96	60±	15	–	B–G.	13
Southerly,	1.14	1.14	60	15	-	B.	14
Westerly,	1.36	1.36	50–60	15	3-4	B.	15
North-westerly,	1.09	.60	60	-	-	F.	16
South-easterly,	1.06	1.06	66	18	3	A.	17
Easterly,	7.79	7.79	40–50–50+	15	3	B.	18
Northerly,	1.36	1.36	50–50+	15	-	B.	19
Northerly,	.70	.70	50–50+	15	-	B.	20
Southerly,	2.34	2.34	60–50	-	-	1897 H, 1899 F.	21
Northerly,	1.63	1.63	50	-	-	F.	22
Easterly,	1.87	1.87	33	16	8.5	B.	23
Westerly,	.66	.66	50	15	3	B.	24
Northerly,	.66	.66	50–60	15	-	B.	25
Easterly,	.87	.87	50+–88–100	15	-	A–G.	26
Easterly,	2.24	2.24	50	15	[4] 3	A.	27
Westerly,	.39	.39	55–60	15	-	A.	28
Westerly and southerly.	3.94	3.94	30–50	24–18–15–12	[5] 3	A–C.	29
Northerly,	1.94	1.94	40–50	15	-	B.	30
North-westerly,	.88	.88	40–60	15	-	B.	31
Northerly,	.57	.30	60	15	-	B.	32
Easterly,	.77	.77	50–42+	15	3	D.	33
Southerly,	1.91	1.91	50	15	-	B.	34
Easterly,	.31	.31	50	15	-	B.	35
Westerly,	1.69	1.69	50	15–12	[4] 3	A–O.	36

[4] Exclusive of 275 feet at railroad. [5] Not on 1908 section.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Chatham,	1905,	Harwich line,
2	Chelmsford,	1898-9-1901,	Lowell line to North Chelmsford,
3	Chelmsford,	1903-4,	Lowell line toward Chelmsford Centre.
4	Chelsea,	1901-4,	Lewis Street,
5	Cheshire,	1899-1900-1-2,	Farnham's station, Boston & Albany Railroad.
6	Chester,	1899-1900-1-2-4,	Becket line,
7	Chester,	1905,	Easterly end of 1904 section,
8	Chicopee,	1897-8-9,	Springfield line,
9	Chicopee,	1902-3-4,	Near Chicopee River bridge,
10	Chicopee,	1905,	Northerly end of 1904 section,
11	Chilmark,	1905,	Near Beetlebung Corner,
12	Clarksburg,	1905,	North Adams line,
13	Cohasset,	1897-8-1900,	Near Hingham line,
14	Cohasset,	1902-3,	Beechwood Street to Scituate line,
15	Colrain,	1898-1901,	Shelburne line,
16	Colrain,	1905,	
17	Concord,	1897-8,	Lincoln line,
18	Concord,	1900,	Acton line,
19	Concord,	1905,	South-easterly end of 1900 section,
20	Cottage City,	1894-5-6,	Sengegontacket bridge,
21	Dalton,	1895-6-1903-4,	Pittsfield line,
22	Dartmouth,	1898-9-1900-1-3,	Near Westport line,
23	Dartmouth,	1905,	Easterly end of 1903 section to New Bedford line.
24	Deerfield,	1894-5,	South Deerfield station to Sunderland bridge.
25	Deerfield,	1900-1-2-3,	Cheapside bridge,
26	Deerfield,	1904,	South Deerfield village,
27	Deerfield,	1905,	Northerly end of 1904 section,
28	Dennis (north),	1895-6-7-8,	Yarmouth line to Brewster line,
29	Dennis (south),	1900-1-2-4,	Bass River bridge,
30	Dighton,	1902-3,	Dighton line to Rehoboth line,
31	Dighton,	1905,	Near Three Mile River bridge,
32	Douglas,	1902-4,	Sutton line at Manchaug,
33	Douglas,	1905,	Main Street,
34	Dover,	1905,	Charles River bridge,
35	Dracut,	1905,	Near Lowell line on Methuen road,
36	Dudley,	1902-4,	1,400 feet from Webster line,

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Easterly, . .	1.35	1.35	50–55	15	–	O.	1
Westerly, . .	1.44	1.43	50	18–15	3	A.	2
South-westerly,	1.27	1.27	60	18	–	O.	3
South-westerly,	.96	.96	66	24	–	A.	4
North-easterly, .	2.60	2.60	50–50+	15	–	1899–1900 A–G, 1901–2 F.	5
Easterly, . .	2.85	2.85	40–50	15–12	–	A.	6
Easterly, . .	.40	.40	50	15	–	B.	7
Northerly, .	.92	.92	50–55–60	20	4–3	A.	8
Northerly, .	1.42	1.42	50+–60–84–100	18	–	A.	9
Northerly, .	.43	.43	50–100	18	–	A.	10
South-westerly,	1.13	1.13	40	12	–	B.	11
North-easterly, .	.60	.48	50	15	–	D.	12
Easterly, . .	1.73	1.73	50–50+	15	3	B–D.	13
Southerly, . .	.55	.55	47–60+–70	15	–	C.	14
Northerly, .	1.83	1.83	40–50–50+	–	–	H.	15
Northerly, .	.30	.30	40	–	–	F.	16
North-westerly,	1.47	1.47	50	15	3	B.	17
South-easterly, .	.52	.52	50	15	–	A–G.	18
South-easterly, .	.98	.85	50–60	15	–	A.	19
Northerly, .	2.37	2.37	50	15	3	B.	20
Easterly, . .	2.55	2.55	70–50–57–60–62–66	15	[1] 3	A.	21
Easterly, . .	3.37	3.37	80–80+	18	–	B.	22
Easterly, . .	1.16	–	75	18	–	B.	23
South-easterly, .	1.53	1.53	30	15	3	A.	24
Southerly, .	1.43	1.43	50	15	–	A.	25
Northerly, .	.45	.45	50–83	15	–	A.	26
Northerly, .	.42	–	50–70	15	–	A.	27
North-easterly, .	4.27	4.27	40–50–65	15	3	B.	28
Easterly, . .	2.40	2.40	40–45–50–50+	15	–	A–O.	29
South-westerly,	1.56	1.56	47.5–66	15	–	B.	30
South-westerly,	.29	–	40–50	–	–	–	31
South-easterly, .	1.60	1.60	40+–50	15	–	B.	32
South-easterly, .	.54	.54	50	15	–	B.	33
Westerly, . .	.99	.99	40	–	–	F.	34
North-easterly, .	.97	Partly graded.	50	–	–	–	35
Westerly, . .	1.05	1.05	66	15	–	A–G.	36

[1] 1895–6 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Duxbury,	1894-5-7-9-1903,	Marshfield line,
2	Duxbury,	1905,	Southerly end of 1903 section,
3	Eastham,	1903,	Wellfleet line,
4	Eastham,	1904,	About one mile from Orleans line,
5	Eastham,	1905,	Northerly end of 1904 section,
6	Easthampton,	1895-6,	Northampton line,
7	Easthampton,	1900-1,	Clark Street at foot of Mount Tom,
8	East Longmeadow,	1904,	East Longmeadow village toward Springfield.
9	Easton,	1900,	Brockton line,
10	Edgartown,	1897-9-1900-1-2-3,	Cottage City line,
11	Erving,	1898-9-1900,	Town hall to Orange line,
12	Essex,	1902-3,	Essex River,
13	Fairhaven,	1894-5,	Mattapoisett line,
14	Falmouth,	1904,	Bourne line to Woods Hole,
15	Falmouth,	1905,	East Falmouth village,
16	Fitchburg,	1894-5,	Westminster line,
17	Fitchburg,	1897,	Lunenburg line,
18	Fitchburg,	1900-1-3-4,	Ashby line,
19	Foxborough,	1901-2,	Mansfield line,
20	Foxborough,	1905,	Wrentham line,
21	Framingham,	1904,	Railroad tracks on Pleasant Street,
22	Framingham,	1905,	1904 section to Southborough line,
23	Franklin,	1905,	Bellingham line,
24	Freetown,	1902-3,	New Bedford line to Lakeville line,
25	Gardner,	1897-8,	Templeton line,
26	Gardner,	1900-1,	Westminster line,
27	Gloucester,	1894-5-8,	Manchester line,
28	Gloucester,	1905,	End of 1898 section to "cut" bridge,
29	Goshen,	1894-5,	Williamsburg line,
30	Grafton,	1897-9-1900,	Millbury line,
31	Grafton,	1905,	Southerly end of 1900 section,
32	Granby,	1894-1902,	South Hadley line,
33	Granby,	1905,	Easterly end of 1902 section,
34	Great Barrington,	1894-6-7-1902,	Housatonic River bridge,
35	Greenfield,[3]	1899-1900-2,	Washington Street,
36	Greenfield,	1903,	Silver Street,

[1] Not on 1903 section.
[2] Experiment in oiling road.
[3] Exclusive of 500 feet at Cheapside bridge and 1,100 feet at railroad crossing.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Southerly, . .	2.84	2.84	30-40-50	15	[1]	B-C-O-G.	1
Southerly, . .	1.02	1.02	40-50	15	-	C-O.	2
Southerly, . .	.78	.78	40	15	-	K.	3
Northerly, .	.85	.85	50	15	-	B.	4
Northerly, .	.88	.88	50±	-	-	[2]	5
South-westerly,	1.32	1.32	40	15	3	A.	6
Southerly, .	1.10	1.10	49.5	15	3	A.	7
North-westerly,	.59	.59	49.5	15	-	A.	8
South-westerly,	.80	.80	70	15	3	B-G.	9
Southerly, .	2.42	2.42	50-66	15	[3] 3	B.	10
Easterly, . .	2.04	2.04	50-50+	-	-	F 1898-A.	11
Easterly and westerly.	.35	.35	36-50	15	-	A.	12
Westerly, . .	1.45	1.45	30	15	3	B.	13
Southerly, .	11.64	11.64	40±	15	-	B.	14
South-westerly,	.55	.55	45-50	15	-	O.	15
Easterly, . .	.97	.97	50	15	3	A.	16
Westerly, . .	.61	.61	50	18-15	3	D.	17
Southerly, .	2.56	2.56	50-50+	15	-	B.	18
Northerly, .	1.82	1.82	50	15	-	B-G.	19
Easterly, . .	1.02	.95	60	15	-	B.	20
North-westerly,	1.14	1.14	40-52	15	-	B.	21
North-westerly,	1.28	1.00	40-50	15	-	B.	22
Easterly, . .	.73	-	40-50	15	-	B.	23
Northerly, .	3.19	3.19	50-50+	15	-	B-G.	24
Easterly, . .	2.37	2.37	50+	15	-	A-G.	25
North-westerly,	.98	.98	60	15	-	A-N.	26
North-easterly, .	2.48	2.48	50	15	3	C-B.	27
Northerly, .	.86	.57	40-40+	15	-	B.	28
North-westerly,	1.91	1.91	50	15	3	B.	29
South-easterly, .	1.56	1.56	50	15	3	A-B-G.	30
Southerly, .	.49	-	50	15	-	A.	31
North-easterly, .	1.03	1.01	36-50	15	[4] 3	A.	32
North-easterly, .	.43	.45	50	15	-	A.	33
Easterly, . .	3.41	3.41	40-50-70	18-15	[4] 3	1894-6 A, 1897-1902 F.	34
Easterly, . .	1.33	1.33	49.5-50	18-15	[5] 3	A.	35
North-easterly, .	.41	.41	50	15	-	A.	36

[1] 1897-9 sections.
[2] 1899-1900 sections.
[4] 1894 section.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Greenfield,	1905,	One mile from town section on Colrain road.
2	Groton,	1901-2,	Near Nashua River at Pepperell line.
3	Groveland,	1900-1-2,	King Street to West Newbury line,
4	Groveland,	1905,	Merrimac River bridge,
5	Hadley,	1894 to 1904,	Connecticut River to Amherst line,
6	Hamilton,	1899-1900,	Ipswich line,
7	Hancock,	1895-6-8-9,	Pittsfield line to New York line,
8	Hardwick,	1897-1901,	New Braintree line,
9	Harvard,	1900,	Woodchuck Hill,
10	Harvard,	1905,	End of 1900 section to Harvard Common.
11	Harwich,	1899-1900-1-2-3,	Dennis line to Chatham line,
12	Hatfield,	1901,	Northampton line,
13	Haverhill,	1899,	River and Maxwell streets,
14	Haverhill,	1902,	Kenoza Road,
15	Hingham,	1894,	Weymouth Back River,
16	Hingham,	1896-7,	Near Cohasset line,
17	Hinsdale,	1901-2-3,	Dalton line,
18	Holbrook,	1894-6-1902,	Weymouth line,
19	Holden,	1894-5-6-7,	Jefferson Village,
20	Holden,	1898-1900,	Worcester line,
21	Holden,	1905,	Rutland line,
22	Huntington,	1895-6,	Russell line,
23	Huntington,	1903,	Near railroad crossing,
24	Kingston,	1905,	Duxbury line,
25	Lakeville,	1901-2,	One-half mile from Middleborough line.
26	Lancaster,	1902,	Clinton line to Sterling line,
27	Lawrence,	1896,	Methuen line,
28	Lee,	1894-5-6,	Lee Park,
29	Lee,	1900,	Lenox line,
30	Leicester,[1]	1894-5-6-8-9,	Worcester line to Spencer line,
31	Lenox,	1899-1900-1,	Lee line to Lenox Village,
32	Lenox,	1904-5,	Lenox Village,
33	Lenox,	1905,	Northerly end of 1904 section to Pittsfield line.
34	Leominster,	1901-2,	Sterling line,
35	Lexington,	1895-6-7-8,	Massachusetts Avenue,
36	Lexington,	1900,	Bedford line,

[1] 1895-6-7-8-9 sections.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

ROAD LAID OUT.		Length constructed (Miles).	WIDTHS.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Northerly, .	.26	.26	50	–	–	F.	1
South-easterly, .	1.38	1.38	50	15	–	A-G.	2
North-easterly, .	1.45	1.45	50	15	–	A.	3
North-easterly, .	.28	.28	50–57	15	–	A.	4
Easterly, . .	4.69	4.69	50–82.5–66±	15	[1] 3	A.	5
South-westerly,	1.44	1.44	50–60	15	3	B.	6
Westerly, . .	3.23	3.23	50	15	–	C-F.	7
Northerly, .	.82	.82	50	15	3	A.	8
Westerly, . .	.70	.70	60	15	–	B.	9
Westerly, . .	.88	.88	50	15	–	B.	10
Easterly, . .	5.10	5.10	40–40±	15	–	A-O-G.	11
North-easterly, .	.39	.39	50	15	–	A.	12
Westerly, . .	2.08	2.08	70	15	–	B.	13
North-easterly, .	1.07	.91	50–60	15	–	B.	14
Easterly, . .	1.42	1.42	34	–	–	F.	15
Westerly, . .	1.23	1.23	50–33+	15	3	D.	16
South-easterly, .	1.02	1.02	50–50+	15	–	A.	17
North-westerly,	1.75	1.75	50	15	–	B-G.	18
South-easterly, .	2.70	2.70	30–49.5	18–15	3	B.	19
Northerly, . .	1.06	1.06	50	15	3–5	B.	20
Easterly, . .	.52	.52	50	15	–	B.	21
Westerly, . .	1.01	1.01	50+	15	3	A.	22
Westerly, . .	.53	.53	50	15	–	A-G.	23
Southerly, . .	.68	–	44–50	–	–	–	24
South-westerly,	3.57	3.57	45–50	15	–	B-G.	25
Northerly, .	1.25	1.20	49.5	18	–	A.	26
Southerly, .	.27	.27	50	18	7	C.	27
Easterly, . .	1.98	1.98	35–40–50	24–15	3	D.	28
Southerly, . .	1.26	1.26	50	15	3	D.	29
Westerly, . .	4.87	4.87	39–53–55–67+	24–18–16–15	3–5–5.5	1894–5–6 D, 1898–9 B.	30
Northerly, .	2.28	2.28	60–66–56±	15	3	D.	31
Northerly, .	2.55	2.55	50+–64–100	15	–	B.	32
Northerly, .	.45	.45	60	15	–	B.	33
Northerly, .	2.18	2.18	50	15	–	F-O.	34
Westerly, . .	3.45	3.45	50–50+	15	3	B.	35
South-easterly, .	.85	.85	50	15	3	B.	36

[1] Exclusive of portion through Leicester Centre.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From—
1	Lincoln,	1895-6-7,	Concord line to Lexington line,
2	Littleton,	1902-3-4,	Acton line via Great Road,
3	Littleton,	1902,	Westford line to Great Road,
4	Lowell (Boulevard),	1897,	Tyngsborough line,
5	Lowell (Princeton Street),	1897-8,	Chelmsford line,
6	Lunenburg,	1898-9-1900-1-3,	Fitchburg line,
7	Lynn,	1899,	Saugus River near Revere line,
8	Mansfield,	1901,	Foxborough line,
9	Marion,	1894-5-1901,	Marion Village to Wareham line,
10	Marion,	1897-9-1901-2,	Marion Village to Mattapoisett line.
11	Marion,	1903,	Marion Village to Rochester line,
12	Marlborough (east),	1897-1902-3-4,	Sudbury line to Hosmer Street,
13	Marlborough (west),	1897-9-1900-1,	Northborough line,
14	Marshfield,	1894-6-8-9-1901-2-4,	Duxbury line,
15	Mattapoisett,	1894-5,	Fairhaven line,
16	Mattapoisett,	1900-1-3,	Marion line to Ned Point Light road.
17	Merrimac,	1897-8-9,	Near Haverhill line,
18	Merrimac,	1901-3,	Amesbury line,
19	Methuen,	1896-1900-1-2,	Lawrence line,
20	Middleborough,	1894-5-6-7-8-1902-3,	Nemasket River to Rochester line,
21	Milford,	1904,	Highland Avenue via West Street,
22	Milford,	1905,	End of 1904 section to Hopedale line.
23	Millbury,	1902,	Worcester line to Grafton line,
24	Millbury,	1900-3-4,	Worcester line,
25	Milton,	1899-1900,	Neponset River to Granite bridge,
26	Monson,	1894,	Railroad bridge,
27	Monson,	1901,	Palmer line,
28	Monson,	1905,	End of 1901 section to Brimfield line.
29	Montague,	1898 9-1904,	Third Street near L Street, Turner's Falls.
30	Montague,	1905,	Connecticut River bridge to Greenfield.
31	Nantucket,	1894-5-6-7-9-1900-1-3,	First mile stone, near Orange Street.
32	Natick,	1901,	Wellesley line to Union Square,
33	Natick,	1903,	Sherborn line to Cemetery Street,
34	Needham,	1901,	Newton line,
35	Needham,	1905,	Charles River bridge,
36	New Braintree,	1897,	Hardwick line to Ware line,

[1] 1898-9-1900 sections. [2] 1894-5 sections. [3] 1897-9 sections. [4] 1897 section.
[9] 1898-9 sections. [10] 1894 to 1900 sections, inclusive.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
South-easterly,	2.06	2.06	50	15	3	-	1
Northerly,	2.13	2.13	40-50-62	-	-	F.	2
South-westerly,	.32	.32	50	-	-	F.	3
Easterly,	.97	.97	60	15	3	D.	4
Easterly,	1.34	1.34	50±	18	6	D.	5
Easterly,	2.72	2.72	50-50+	15	[1] 3	D, 1903 B-G.	6
North-easterly,	.90	.78	70	-	-	N.	7
South-easterly,	.72	.72	50	15	-	B-G.	8
North-easterly,	1.59	1.59	40-50-65	15	[2] 3	B.	9
Westerly,	1.84	1.84	40-50-55	15	[3] 3	B.	10
North-westerly,	2.14	3.14	40-50	15	-	B.	11
Westerly,	3.10	3.10	40-50-60	15	[4] 3	B.	12
Easterly,	2.41	2.41	50-65	15	5-4-3	B.	13
Northerly,	4.00	4.00	30-40-45-50	15	[5] 3	-	14
Easterly,	1.16	1.16	30	15	3	B.	15
Westerly,	2.05	2.05	40-50	15	-	B.	16
North-easterly,	.92	.92	50-50+	15	4-3	B-C.	17
South-westerly,	1.20	1.20	50-60	15	-	B-C.	18
North-easterly,	2.63	2.63	50	15	[6] 3	C-B.	19
South-easterly,	8.98	8.98	50	15	[7] 7.5-[8] 3	B-G.	20
North-easterly,	1.18	1.18	50-50+	15	-	B.	21
North-easterly,	.57	.57	50	15	-	B.	22
South-easterly,	.78	.78	50	15	-	A-G.	23
Southerly,	1.61	1.61	50	15	-	A.	24
South-easterly,	.87	.87	49.5-82.5	24	4	A.	25
Northerly,	.93	.93	36	15	3	A.	26
South-easterly,	.10	.10	50	15	-	A.	27
South-easterly,	.29	.29	50	15	-	A.	28
Easterly,	2.48	2.48	60	15	[9] 3	A-C.	29
North-easterly,	1.07	-	50-60	-	-	-	30
Easterly,	6.48	6.48	66	15-12	[10] 3	B-E-G.	31
Westerly,	1.14	1.14	60-70	15-18-20	-	A-G.	32
Easterly,	2.06	2.06	60	15	-	D-G.	33
Westerly,	1.00	1.00	60-86	22	-	B.	34
Northerly,	1.04	.80	50	15	-	C.	35
Southerly,	.17	.17	50	15	3	A.	36

[1] 1894-6-8-9 sections. [6] 1896 section. [7] 1894 section. [8] 1895-6-7-8-9 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	New Braintree,	1903,	New Braintree village,
2	Newbury,[1]	1899–1900–1–2–4,	Newburyport line via Oldtown,
3	Newbury,	1905,	End of 1904 section to Rowley line.
4	Newburyport,	1896–7–8,	West Newbury line,
5	Newton,	1901,	Needham line,
6	Norfolk,	1895,	Norfolk line to Wrentham line.
7	North Adams,	1894–6–7,	Williamstown line,
8	North Adams,	1900–1–2–3,	Boston & Maine Railroad bridge to Adams line.
9	North Andover,	1900–2–4,	Lawrence line,
10	Northampton,	1894,	Hadley bridge,
11	Northampton,	1897–8–9–1900–5,	Easthampton line,
12	Northampton,	1905,	Smith Ferry Road to Reservoir Road.
13	North Attleborough,	1894–5–6–7–9,	Bruce Avenue to Attleborough line.
14	Northborough (East),	1897–8,	Marlborough line,
15	Northborough (West),	1900–2–4,	Shrewsbury line,
16	Northborough (South),	1897,	Westborough line,
17	North Brookfield,	1905,	Junction of Ward and Gilbert streets.
18	Northfield,	1901–2,	Near Mill Brook,
19	North Reading,[4]	1897–8–1901–3,	Andover line to Reading line,
20	Norton,	1903,	Village to near railroad station,
21	Norwood,	1897–9,	Walpole line,
22	Norwood,	1895–6,	Westwood line,
23	Orange,	1894–5–7,	Athol line,
24	Orange,	1900–1–3–4–5,	Erving line,
25	Orleans,	1900–1–4,	Brewster line to Eastham line,
26	Orleans,	1903–4,	1½ miles from Shattuck's Corner,
27	Orleans,	1905,	End of 1904 section,
28	Palmer,	1899–1900–1,	Tennyville to Monson line,
29	Palmer,	1905,	Near Quaboag River bridge,
30	Paxton,	1895–6–7–8–1902,	Worcester line,
31	Pembroke,	1905,	North River bridge at Hanover line,
32	Phillipston,	1897–8–1902–4,	Athol line,
33	Pittsfield,	1894–8–1901–2,	Hancock line,
34	Pittsfield,	1897,	Dalton line,
35	Pittsfield,	1904,	South Mountain Road,
36	Pittsfield,	1905,	End of 1904 section to Lenox line.

[1] Exclusive of Parker River bridge. [2] 1899–1900 sections. [3] 1900 section.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Northerly,	.22	.22	50±	-	-	F.	1
Southerly,	3.37	3.37	50–60–66–70–80–95	15	[3]3	B.	2
South-westerly,	.71	.71	50–60	-	-	F.	3
Easterly,	1.75	1.75	60–66+75+	15	3	C.	4
Easterly,	1.03	1.03	45–86	22	-	A.	5
South-westerly,	1.45	1.45	50	15	3	B.	6
Easterly,	1.69	1.69	30–66	15	3	D.	7
Southerly,	2.32	2.09	50–65	15	[3]3	A, 1903–N.	8
South-easterly,	1.68	1.68	60–66	15	[3]3	A–D.	9
South-westerly,	.56	.56	40	20	3	C.	10
Northerly,	1.47	1.47	50–50±	15	3	A.	11
South-westerly,	.86	.86	66	-	-	N.	12
South-westerly,	3.60	3.60	36–66	24–18–15	3	1894–5 B, 1896–7–9 F.	13
South-westerly,	1.33	1.33	66	15	4–3	B.	14
Easterly,	2.19	2.19	66	15	[3]3	B.	15
North-westerly,	.42	.42	50	15	3	B.	16
Southerly,	.50	-	49.5	15	-	A.	17
Southerly,	1.16	1.16	70–135–156–160	15	-	A.	18
Southerly,	2.31	2.31	66	15	[3]3	C–B.	19
Easterly,	.72	.72	40	15	-	B.	20
Northerly,	1.03	1.03	40–50–60	15	3	B.	21
Northerly,	1.02	1.02	40–50–67	15	3	B.	22
Westerly,	2.18	2.18	30–49.5	17	3–5	D–A.	23
Easterly,	2.61	2.61	50–50±	15	-	B–A–G.	24
North-easterly,	1.98	1.98	50–50+	15	-	B.	25
South-easterly,	1.69	1.69	50	12	-	B–G.	26
Southerly,	.47	.47	45–50	12	-	B.	27
South-easterly,	2.52	2.52	50±	15	3	G–A.	28
Easterly,	1.73	Partly graded.	50	-	-	N.	29
North-westerly,	3.60	3.60	50–65–70	15	3–5	B.	30
Southerly,	.33	.33	50	15	-	B.	31
Easterly,	1.95	-	50	12	[5]3	A–B.	32
Easterly,	2.38	2.38	40–50–60	15	[6]3	A.	33
Westerly,	.76	.76	50	15	-	A–G.	34
Southerly,	.76	.76	50–100	15	-	B	35
Southerly,	.82	.82	55–60	15	-	B.	36

[4] Exclusive of 1,200 feet at railroad crossing. [5] 1897–8 sections. [6] 1894–8 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Plainville,	1894–5,	North Attleborough line to Wrentham line.
2	Plymouth,	1894–5–6–7–8–1902–4,	Manomet village,
3	Princeton,	1897–1900–2–3,	Princeton depot,
4	Provincetown,	1901–3,	Truro line to Allerton Street,
5	Quincy,	1899,	Chubbuck Street to Fore River bridge.
6	Quincy,	1902,	Braintree line,
7	Quincy,	1904,	Randolph line to Milton line,
8	Randolph,	1902–3,	Quincy line,
9	Raynham,	1901–2–3,	Taunton line to Raynham village,
10	Reading,	1899–1900,	Stoneham line,
11	Reading,	1902–3,	North Reading line,
12	Rehoboth,	1895–6–9–1903,	Seekonk line,
13	Rehoboth,	1905,	End of 1903 section,
14	Revere,	1897–8,	Boston line,
15	Revere,	1899,	Saugus line,
16	Richmond,	1897–8–9–1901–2–3–4,	Boston & Albany Railroad section,
17	Richmond,	1905,	End of 1904 section,
18	Rochester,	1903,	Marion line to Acushnet line,
19	Rockland,	1902,	Abington line,
20	Rockland,	1905,	Hanover line,
21	Rockport,	1902,	Near Gloucester line,
22	Rowley,	1905,	Newbury line,
23	Russell,	1894–5–6–7–8–9,	Westfield line to Huntington line,
24	Rutland,	1904,	Holden line,
25	Salem,	1901,	Swampscott line,
26	Salisbury,	1904,	Town Creek,
27	Salisbury,	1905,	Town Creek,
28	Sandwich,	1897–8–1900–2,	Barnstable line,
29	Saugus,	1899,	Fox Hill bridge to Revere line,
30	Scituate,	1894–5–1900–3,	Gannett's Corners,
31	Seekonk,	1900–1–2–4,	Rehoboth line to Rhode Island line,
32	Shelburne,	1894–5–6–7,	Bridge Street to Colrain line,
33	Shrewsbury,	1895–6–7–8–9–1900–4,	Worcester line to Northborough line.
34	Somerset,	1895–6–7–9–1900–1–2,	Slade's Ferry bridge,
35	Somerset,	1903–4,	Slade's Ferry bridge to Swansea line.
36	Southampton,	1905,	Easthampton line,

[1] 1894 and 1898 sections inclusive. [2] 1897 section. [3] 1895–6–9 sections.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Northerly, .	1.81	1.81	26-50	15	3	B.	1
Northerly, .	5.05	5.05	40-40+50-112	15	[1] 3	B.	2
Easterly, . .	2.23	2.23	50	15	[2] 3	B.	3
Westerly, . .	1.10	1.10	33-50	15	-	B-O-G.	4
South-easterly, .	.49	.49	63-66	32	-	A.	5
Northerly, .	.57	.53	66	15	-	B.	6
Northerly, .	1.23	1.23	52-66	15	-	B.	7
South-easterly, .	1.38	1.38	66	15	-	B.	8
North-easterly, .	1.48	1.48	40-40+	15	-	O.	9
Northerly, .	1.07	1.07	66	15-18	3	B.	10
Southerly, .	2.67	2.67	66	15-18	-	B.	11
Easterly, . .	2.59	2.59	60-50+	15	[3] 3	B-G.	12
Easterly, . .	.92	.92	50-54	15	-	B.	13
North-easterly, .	.58	.58	44-50	34	3	A.	14
South-westerly,	.67	.67	71	22	2	A.	15
Northerly, .	2.72	2.72	50-66	-	-	F.	16
Northerly, .	.44	.44	50	-	-	F.	17
Westerly, . .	5.27	5.27	33-62	15	3	B.	18
North-easterly, .	1.00	1.00	50	15	-	B.	19
Easterly, . .	.91	.91	50-58	15	-	B.	20
Northerly, .	.32	.32	50+	15	-	A.	21
South-easterly, .	.13	.13	50-82	-	-	N.	22
North-easterly, .	6.66	6.66	50	15	[4] 3	1894-5 A, 1896-7-8-9 F.	23
North-westerly,	1.16	1.16	50-59	15	-	B.	24
Northerly, .	.13	.13	60+	-	-	F.	25
Northerly, .	1.10	1.10	50-99	21	-	A.	26
Southerly, .	.35	.35	50-66	21-15	-	A.	27
Westerly, . .	2.83	2.83	50	15	[5] 3	O-B.	28
Southerly, .	1.60	1.60	71±	22	2	A.	29
South-easterly, .	2.52	2.52	30-40-50	15	[4] 3	A-B-C.	30
Westerly, . .	2.76	2.76	60	15-20	-	B-A.	31
North-easterly, .	2.16	2.16	30-50	18-15	3	B-A.	32
North-easterly, .	4.86	4.86	50-65-66	18-15	3	B.	33
Northerly, .	4.50	4.50	40-50-60	18-15	[6] 3	B.	34
North-westerly,	1.89	1.89	45-60	15	-	B.	35
South-westerly,	.66	.66	50	-	-	F.	36

[4] 1894-5 sections. [5] 1897-8 sections. [6] 1895-6-7-9 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Southborough,	1902,	Westborough line,
2	Southborough,	1905,	End of 1902 section,
3	Southbridge,	1902,	Charlton line,
4	South Hadley,	1895-7-8-9-1900,	Granby line to South Hadley Falls,
5	South Hadley,	1903-4,	South Hadley to South Hadley Falls.
6	Spencer,	1897-1900-1,	Leicester line,
7	Sterling,	1897-8,	Near town hall,
8	Sterling,	1905,	Lancaster line,
9	Stockbridge,	1905,	Lee line at South Lee,
10	Stoneham,	1897-8,	South Street,
11	Stoneham,	1900-1,	Reading line,
12	Stoughton,	1902-3,	Canton line to Lincoln Street,
13	Stoughton,[1]	1904,	Walnut Street,
14	Stoughton,	1905,	End of 1904 section to Easton line,
15	Sturbridge,	1897-1903-4,	Fisk Hill Road,
16	Sudbury,	1897-8-1900-1-2-3,	Marlborough line to Wayland line,
17	Sunderland,	1897-1903-4,	Connecticut River bridge,
18	Sutton,	1899-1901-2,	Millbury line,
19	Sutton,	1903-4,	Douglas line at Manchaug,
20	Swampscott,	1897-1900-1,	Salem line to Burrell Street,
21	Swansea,	1903,	Somerset line,
22	Swansea,	1903,	Nyles River bridge,
23	Taunton,	1895-6-8-9-1900-1,	Dighton line on Winthrop Street,
24	Taunton,	1905,	Near Three Mile River bridge,
25	Templeton,	1899-1901-2-3,	Gardner line at Otter River,
26	Templeton,	1905,	Junction of Main and Maple streets.
27	Tewksbury,	1900-1-2-3-4,	Lowell line,
28	Tewksbury,	1905,	End of 1904 section,
29	Tisbury,	1894,	Vineyard Haven to West Tisbury line.
30	Townsend,	1896-7-8-9-1900-1,	Groton line,
31	Truro,	1895,	Wellfleet line to Kelley's Corner,
32	Tyngsborough,	1895-6,	Tyngsborough bridge to Lowell line.
33	Uxbridge,	1897-8-1901-3,	Blackstone line,
34	Wales,	1901,	Brimfield line,
35	Walpole (north),	1894-5-7-1900,	Norfolk line,
36	Walpole (south),	1897-8-1900,	Norwood line,

[1] Exclusive of 250 feet at railroad bridge. [2] 1897 section.

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CONTRACTED FOR BY THE COMMISSION, ETC.— *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Easterly, . .	.76	.76	50±	-	-	F.	1
Easterly, . .	1.13	-	40-50	-	-	-	2
South-westerly,	.91	.91	50	-	-	F.	3
South-westerly,	2.42	2.42	36-50	15	3	A.	4
Southerly, .	2.71	2.71	49.5-60-64-110	15	-	A.	5
Westerly, . .	1.60	1.60	50-58-60	15	4-3	B.	6
South-westerly,	1.29	1.29	50	15	3	A.	7
Westerly, . .	.65	.50	49-50	15	-	A.	8
Easterly, . .	.55	.55	50	15	-	A.	9
Northerly, .	.57	.57	60-66	15	7-5	B.	10
Southerly, .	1.01	1.01	66	15	-	B-G.	11
Southerly, .	1.16	1.16	60	15	-	B.	12
Southerly, .	.83	.83	66	15	-	B.	13
Southerly, .	1.31	1.20	66	15	-	B.	14
North-westerly,	1.39	1.39	50-50+	15	[2] 4-3	B.	15
Easterly, . .	5.11	5.11	49.5-50-60	15	[2] 3	B, 1903 A.	16
South-easterly, .	.98	.91	50	15	[2] 3	A.	17
Southerly, .	1.46	1.46	50	15	-	B.	18
Northerly, .	.82	.82	50-50±	15	-	B.	19
South-westerly,	1.49	1.49	50-60-64-50±	18-20	-	1897 F, 1900-1 A.	20
North-westerly,	.31	.31	50-65	15	-	B-G.	21
Easterly and westerly.	.80	.80	40-50-55	15	-	B-G.	22
Easterly, . .	2.94	2.94	40-66	15	3	B.	23
North-easterly, .	1.04	1.04	40-50	15	-	B.	24
Westerly, . .	2.00	2.00	50	15	-	A-G.	25
Westerly, . .	.50	.50	50±	15	-	A.	26
South-easterly, .	4.81	4.81	50-50±	15	-	A-B, 1903.	27
South-easterly, .	.80	.80	50±	15	-	B.	28
South-westerly,	1.93	1.93	50	15	3	B.	29
North-westerly,	4.69	4.69	50-55-60	15	3	B-A-F-G.	30
Northerly, .	2.36	2.36	40	10-15	-	K-M.	31
South-easterly, .	2.95	2.95	60	15	3	A-D.	32
North-westerly,	2.18	2.18	50-50±	15	-	D-A, 1903 F.	33
South-westerly,	1.04	1.04	50±	-	-	F.	34
Northerly, .	2.60	2.60	50	15	3	C-B.	35
Southerly, . .	1.94	1.94	50	15	3	B.	36

[2] 1897-8-1900 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From —
1	Ware,	1897-9-1900-3,	New Braintree line,
2	Wareham,	1896-1901,	Weweantit River bridge, Marion line.
3	Wareham,	1898-1901,	Cohasset Narrows bridge,
4	Wareham,	1905,	Parkers Mills,
5	Warren,	1896-7-8,	West Warren,
6	Warren,	1899-1900-1,	Warren to West Brookfield line,
7	Watertown,	1895-6,	Waltham line,
8	Wayland,[1]	1897-1900-3,	Weston line to Sudbury line,
9	Wellesley,	1901,	Natick line to Blossom Street,
10	Wellfleet,	1903-4,	Eastham line,
11	Wellfleet,	1905,	End of 1904 section,
12	Wenham,	1897-1901-3,	Beverly line to Hamilton line,
13	Westborough,	1897,	Northborough line,
14	Westborough,	1903,	Southborough line,
15	West Boylston,	1897-8,	Worcester line,
16	West Bridgewater,	1900-1-2-4,	Brockton line to Bridgewater line,
17	West Brookfield,	1899,	Ware line to Ware line,
18	West Brookfield,	1899-1900-1,	Brookfield line,
19	West Brookfield,	1905,	Warren line,
20	Westfield,	1894-6-8-9,	West Springfield line,
21	Westfield,	1898-9-1900-1-2,	Russell line,
22	Westford,	1902,	Littleton line,
23	Westminster,	1894-5-6-7-8-9,	Fitchburg line,
24	Westminster,	1903,	Gardner line,
25	West Newbury,	1895-6-7,	Newburyport line,
26	West Newbury,	1903,	Groveland line,
27	West Newbury,	1904-5,	End of 1903 section,
28	Weston,	1898-9,	Wayland line to near Stony Brook,
29	Westport,	1894-6-7-8,	Dartmouth line,
30	West Springfield,	1895-6,	Top of Tatham Hill,
31	West Springfield,	1905,	Top of Tatham Hill,
32	West Tisbury,	1895-6-7-1904,	Tisbury line to Chilmark line,
33	Westwood,	1899-1900,	Norwood line to Dedham line,
34	Weymouth,	1894,	Holbrook line to Abington line,
35	Weymouth,	1895-6-7,	Fore River to Back River,
36	Weymouth,	1903-4,	Broad Street via Washington Street,

[1] Exclusive of 1,500 feet at railroad crossing and Sudbury River.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Continued.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Southerly, . .	2.28	2.28	50	15	3	A.	1
North-easterly, .	.71	.71	50	15	3	B.	2
Westerly, . .	1.82	1.82	50–40±	15	3	B.	3
North-westerly,	1.02	–	30–50	–	–	–	4
Easterly, . .	1.89	1.89	49.5–50	15	3–4	A.	5
Easterly, . .	1.41	1.41	49.5	15	–	A–G.	6
Easterly, . .	.85	.85	36	27	3–4	A–B.	7
Westerly, . .	2.58	2.58	49.5–50–66–99	15	3	B.	8
Easterly, . .	1.18	1.18	52–60–70	15	–	A–G.	9
Northerly, .	3.00	3.00	40	15–12	–	K.	10
Northerly, .	1.23	1.23	50	12	–	K.	11
Northerly, .	1.75	1.75	50–60	18–15	–	A.	12
South-easterly, .	.76	.76	50	15	3	B.	13
South-westerly,	1.46	1.46	50	–	–	F.	14
Northerly, .	1.55	1.55	50	15	3	1897 H, 1898 A–H.	15
Southerly, .	3.16	3.16	50–55±60±115	15	–	B.	16
South-westerly,	.15	.15	50	15	3	A.	17
North-westerly,	1.51	1.51	50	15	–	A.	18
Easterly, . .	1.01	1.01	50–89	15	–	A.	19
Westerly, . .	2.22	2.22	50	18–15	3	A.	20
Easterly, . .	3.59	3.59	50–50±	18–15	[2] 3	A.	21
Northerly, .	3.25	3.25	40–50	–	–	F.	22
South-westerly,	3.00	3.00	50–60	15	3	D–C.	23
Easterly, . .	2.25	2.25	66±	–	–	F.	24
Westerly, . .	2.24	2.24	50–110	15	3–4.5	A–D.	25
North-easterly, .	.27	.27	50	15	–	A.	26
North-easterly, .	.73	.15	50–50±58	–	–	B.	27
Easterly, . .	3.15	3.15	50	18	–	C–B.	28
Easterly, . .	4.25	4.25	66–80	18	3	C–B.	29
Easterly, . .	1.17	1.17	50–135	18	3	A.	30
Westerly, . .	.57	.45	50	15	–	A.	31
South-westerly,	5.35	5.35	40–40+50	15–12–10	[2] 3	B.	32
Northerly, . .	1.05	1.05	45–55–60	15	3	B.	33
Easterly, . .	.25	.25	50	15	3	B.	34
Easterly, . .	1.75	1.75	50–125	15–18	3	B.	35
Southerly, .	2.80	2.80	50–60–80	15–12	–	B–F.	36

[2] 1898–9–1900 sections. [3] 1895–6–7 sections.

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TABLE SHOWING THE HIGHWAYS LAID OUT OR

	TOWN OR CITY.	Year.	ROAD LAID OUT. From—
1	Whately,[1]	1899-1901-2-3-4,	Deerfield line,
2	Whately,[2]	1905,	End of 1904 section,
3	Whitman,	1894-5-6,	Brockton line,
4	Wilbraham,[3]	1894-5-6-1901-3-4,	Springfield line to Palmer line,
5	Williamsburg,	1896-8-1901-3,	Goshen line,
6	Williamstown,	1895-6-8-1903,	North Adams line,
7	Winchester,	1899-1900,	Arlington line to Woburn line,
8	Windsor,	1897-1902-3,	Cummington line,
9	Woburn,	1900-1-2,	Winchester line to Burlington line,
10	Worcester,	1896-7,	Paxton line,
11	Worcester,	1897-1903,	Holden line,
12	Worcester,	1900,	West Boylston line,
13	Worcester,	1905,	Southerly end of 1900 section,
14	Wrentham,	1899-1900-1,	Plainville line,
15	Wrentham,	1897-8-1902,	Norfolk line,
16	Yarmouth (north),	1894-5-6,	Barnstable line to Dennis line,
17	Yarmouth (south),	1895-6-7,	Barnstable line to Bass River bridge.

[1] 1899 section.
[2] Exclusive of 800 feet at railroad bridge.
[3] 1900 section.
[4] 1897 section.

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CONTRACTED FOR BY THE COMMISSION, ETC. — *Concluded.*

Road laid out.		Length constructed (Miles).	Widths.			Material of Road Surface.	
Direction.	Length (Miles).		Location (Feet).	Macadam (Feet).	Shoulders (Feet).		
Southerly, .	2.80	2.80	50–50+	12	–	A.	1
Southerly, .	.81	.75	50	12	–	A.	2
Easterly, . .	1.70	1.70	45	18	4	B.	3
Easterly, . .	4.81	4.81	50–79–50±	15	[4] 3	A–G.	4
South-easterly, .	2.65	2.65	50	15	–	B–F, 1903 N.	5
Westerly, . .	1.95	1.95	50–60–70	15	3	A–D.	6
North-easterly, .	1.96	1.96	50	15–20–21	–	C.	7
Westerly, . .	.98	.98	50–50±	–	–	F.	8
North-westerly,	2.03	2.03	40–50	15	[4] 3	G–C–B.	9
South-easterly, .	1.35	1.35	50	15	3	B.	10
Southerly, .	1.50	1.50	50	15	3	B.	11
South-westerly,	.54	.54	50	15	3	A.	12
Southerly, .	.68	.68	50	15	–	A.	13
Northerly, .	2.21	2.21	50	15	[4] 3	B.	14
South-easterly, .	1.86	1.86	50	15	3	B–A.	15
Easterly, . .	3.71	3.71	40–60	15	3	B.	16
Easterly, . .	5.09	5.09	40	15	3	B–C.	17

[3] Exclusive of 1,763 feet at Wilbraham village.

[4] 1894–5–6 sections.

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Appendix B.

Table showing Towns and Cities in which Work has been done during the Year 1905, and the Resident Engineers on Such Work, together with Dates of Beginning and Ending.

Town or City.	County.	Lay-out.	Resident Engineer.	Date of Contract.	Date of Beginning.	Date of Ending.
Abington,	Plymouth,	1905,	W. P. Hammersley,	July 13, 1905,	July 24,	Sept. 16.
Attleborough,	Bristol,	1905,	S. Litchfield, Jr.,	June 22, 1905,	July 25,	Sept. 21.
Auburn,	Worcester,	1901-3,	C. A. Welton,	June 29, 1905,	July 24,	Nov. 4.
Auburn,	Worcester,	1895-6-7,	A. D. Dadley,	Oct. 13, 1904,	May 8,	July 29.
Becket,	Berkshire,	1905,	C. A. Brown,	June 8, 1905,	June 21,	July 6.
Bellingham,	Norfolk,	1904,	G. R. Winslow,	Oct. 27, 1904,	Mar. 29,	June 1.
Bellingham,	Norfolk,	1905,	W. T. Wilson,	Sept. 21, 1905,	Oct. 31,	Dec. 14.
Beverly,	Essex,	1st 1905,	F. H. Morris,	April 6, 1905,	April 19,	Aug. 5.
Beverly,	Essex,	1st 1905,	M. J. Adams,	April 6, 1905,	May 1,	June 12.
Beverly,	Essex,	1st 1905,	C. A. Raymond,	April 6, 1905,	June 12,	July 11.
Beverly,	Essex,	2d 1905,	F. H. Morris,	April 20, 1905,	April 25,	July 26.
Beverly,	Essex,	2d 1905,	F. H. Morris,	April 20, 1905,	May 1,	June 12.
Beverly,	Essex,	3d 1905,	G. D. Marshall,	May 4, 1905,	May 9,	July 22.
Beverly,	Essex,	1895-6,	F. H. Morris,	Sept. 21, 1905,	Oct. 23,	Nov. 25.
Bourne,	Barnstable,	1905,	H. C. Holden,	June 8, 1905,	June 26,	Oct. 10.
Boxborough,	Middlesex,	1905,	Wm. Stodder,	Sept. 14, 1905,	Sept. 27,	Dec. 2.
Bridgewater,	Plymouth,	1905,	H. C. Holden,	April 27, 1905,	May 16,	July 24.
Brookfield,	Worcester,	1904,	C. A. Welton,	Feb. 16, 1905,	April 7,	July 15.
Brookfield,	Worcester,	1905,	C. A. Welton,	July 13, 1905,	Mar. 19,	July 15.
Burlington,	Middlesex,	1905,	C. A. Raymond,	Sept. 7, 1905,	Sept. 26,	Dec. 9.
Canton,	Norfolk,	1905,	D. H. Dickinson,	Sept. 7, 1905,	Sept. 18,	Dec. 15.
Chatham,	Barnstable,	1905,	C. H. Howes,	April 27, 1905,	May 31,	Aug. 28.
Chatham,	Barnstable,	1905,	C. H. Howes,	April 27, 1905,	Sept. 19,	Nov. 21.
Chatham,	Barnstable,		W. G. Addis,	—	Nov. 17,	Dec. 16.
Charlton,	Worcester,	1905,	D. H. Winslow,	Aug. 17, 1905,	Aug. 31,	Oct. 10.

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Chelmsford,	Middlesex,	1904,	G. D. Marshall,	Sept. 1, 1904,	April 10,	April 20.
Chelsea,	Suffolk,	1904,	F. C. Pillsbury,	Nov. 10, 1904,	Oct. 9,	Nov. 22.
Chester,	Hampden,	1905,	G. R. Brown,	June 15, 1905,	June 22,	Sept. 16.
Chicopee,	Hampden,	1905,	P. H. Everett,	April 27, 1905,	June 26,	Aug. 8.
Chicopee,	Hampden,	1897,	P. H. Everett,	Sept. 7, 1905,	Oct. 3,	Oct. 28.
Chilmark,	Dukes,	1905,	L. T. C. Loring,	Mar. 30, 1905,	April 28,	Oct. 7.
Chilmark,	Dukes,	–	L. T. C. Loring,	– –	Oct. 16,	Dec. 16.
Clarksburg,	Berkshire,	1905,	G. R. Brown,	July 27, 1905,	Aug. 14,	Nov. 11.
Colrain,	Franklin,	1905,	L. L. Gerry,	Aug. 10, 1905,	Aug. 29,	Nov. 25.
Concord,	Middlesex,	1905,	M. J. Adams,	Aug. 10, 1905,	Aug. 19,	Sept. 22.
Concord,	Middlesex,	1905,	E. J. Nichols,	Aug. 10, 1905,	Sept. 22,	Dec. 28.
Concord (bridge),	Middlesex,	1905,	E. J. Nichols,	Aug. 17, 1905,	Aug. 30,	Dec. 28.
Dartmouth,	Bristol,	1903,	W. G. Addis,	Oct. 27, 1904,	April 16,	July 1.
Dartmouth,	Bristol,	1905,	W. G. Addis,	May 4, 1905,	May 22,	Nov. 4.
Deerfield,	Franklin,	1904,	L. L. Gerry,	Oct. 27, 1904,	May 4,	July 13.
Deerfield,	Franklin,	1905,	L. L. Gerry,	Aug. 3, 1905,	Aug. 16,	Dec. 9.
Deerfield,	Franklin,	1905,	W. G. Burns,	Aug. 3, 1905,	Sept. 27,	Nov. 11.
Douglas,	Worcester,	1905,	D. H. Winslow,	Sept. 21, 1905,	Oct. 10,	Dec. 9.
Dover,	Norfolk,	1905,	G. R. Winslow,	June 8, 1905,	Aug. 14,	Dec. 9.
Dover,	Norfolk,	1905,	W. T. Wilson,	June 8, 1905,	Aug. 21,	Aug. 28.
Dracut,	Middlesex,	1905,	C. A. Raymond,	Oct. 18, 1905,	Oct. 26,	Dec. 1.
Duxbury,	Plymouth,	1905,	W. P. Hammersley,	May 4, 1905,	June 6,	Sept. 28.
Eastham,	Barnstable,	1905,	C. H. Howes,	– –	Sept. 13,	Dec. 19.
Erving,	Franklin,	1898,	L. L. Gerry,	June 1, 1905,	June 16,	July 31.
Falmouth,	Barnstable,	1904,	C. H. Howes,	– –	Sept. 23,	Dec. 16.
Falmouth,	Barnstable,	1904,	M. J. Adams,	– –	Sept. 23,	Nov. 21.
Falmouth,	Barnstable,	1905,	C. H. Howes,	June 29, 1905,	July 31,	Sept. 19.
Falmouth,	Barnstable,	1905,	M. J. Adams,	Sept. 14, 1905,	Nov. 1,	Nov. 21.
Falmouth,	Barnstable,	1905,	C. H. Howes,	Sept. 14, 1905,	Oct. 24,	Dec. 9.
Foxborough,	Norfolk,	1905,	S. Litchfield, Jr.,	Aug. 31, 1905,	Sept. 15,	Nov. 25.
Framingham,	Middlesex,	1904,	G. R. Winslow,	Sept. 29, 1904,	April 17,	Nov. 24.
Framingham,	Middlesex,	1905,	G. R. Winslow,	May 18, 1905,	Aug. 21,	Dec. 1.
Franklin,	Norfolk,	1905,	G. R. Winslow,	July 20, 1905,	Aug. 2,	Aug. 29.
Franklin,	Norfolk,	1905,	W. T. Wilson,	July 20, 1905,	Aug. 28,	Nov. 23.
Gloucester,	Essex,	1905,	D. W. Merrill,	Sept. 7, 1905,	Sept. 20,	Dec. 9.
Grafton,	Worcester,	1905,	C. A. Welton,	Aug. 3, 1905,	Aug. 17,	Dec. 12.
Grafton,	Worcester.	1905,	C. A. Welton,	Aug. 3, 1905,	Aug. 28,	Dec. 12.
Granby,	Hampshire,	1905,	P. H. Everett,	May 11, 1905,	May 30,	Aug. 5.

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TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE, ETC. — *Concluded.*

TOWN OR CITY.	County.	Lay-out.	Resident Engineer.	Date of Contract.	Date of Beginning.	Date of Ending.
Great Barrington,	Berkshire,	1894–5,	G. R. Brown,	July 13, 1905,	July 17,	Sept. 5.
Greenfield,	Franklin,	1905,	L. L. Gerry,	July 27, 1905,	Aug. 26,	Nov. 21.
Groveland,	Essex,	1905,	C. H. Norton,	Sept. 21, 1905,	Oct. 18,	Dec. 9.
Hadley,	Hampshire,	1895,	P. H. Everett,	Aug. 10, 1905,	Sept. 6,	Oct. 14.
Harvard,	Worcester,	1905,	D. H. Dickinson,	Mar. 23, 1905,	April 18,	Aug. 26.
Holden,	Worcester,	1905,	C. A. Welton,	Aug. 31, 1905,	Sept. 20,	Dec. 9.
Lancaster,	Worcester,	1902,	F. H. Cunningham,	Aug. 31, 1905,	Oct. 5,	Nov. 14.
Lancaster,	Worcester,	1902,	P. H. Everett,	Aug. 31, 1905,	Nov. 14,	Nov. 24.
Lenox,	Berkshire,	1904,	A. L. Southworth,	Aug. 4, 1904,	May 20,	Aug. 30.
Lenox,	Berkshire,	1904,	G. R. Brown,	Aug. 4, 1904,	April 26,	May 20.
Lenox,	Berkshire,	1905,	A. L. Southworth,	May 4, 1905,	July 24,	Sept. 1.
Milford,	Worcester,	1904,	G. R. Winslow,	Nov. 17, 1904,	April 19,	Oct. 9.
Milford,	Worcester,	1905,	G. R. Winslow,	April 27, 1905,	May 26,	Oct. 9.
Monson,	Hampden,	1905,	A. C. Downs,	June 8, 1905,	July 19,	Sept. 15.
Needham,	Norfolk,	1905,	W. T. Wilson,	June 8, 1905,	Aug. 21,	Aug. 28.
Needham,	Norfolk,	1905,	G. R. Winslow,	June 8, 1905,	Aug. 2,	Aug. 26.
Needham,	Norfolk,	1905,	G. R. Winslow,	June 8, 1905,	Aug. 28,	Nov. 25.
Newbury,	Essex,	1905,	G. D. Marshall,	July 13, 1905,	July 24,	Nov. 28.
North Adams,	Berkshire,	1894–5–6,	G. R. Brown,	Aug. 10, 1905,	Aug. 29,	Nov. 24.
Northampton,	Hampshire,	1st 1905,	P. H. Everett,	April 20, 1905,	April 28,	Aug. 19.
Northampton,	Hampshire,	2d 1905,	P. H. Everett,	Aug. 3, 1905,	Aug. 17,	Nov. 4.
Northborough,	Worcester,	1904,	A. D. Dadley,	Aug. 4, 1904,	April 10,	May 3.
North Brookfield,	Worcester,	1905,	A. C. Downs,	Sept. 7, 1905,	Oct. 16,	Oct. 21.
North Brookfield,	Worcester,	1905,	A. N. Ashline,	Sept. 7, 1905,	Oct. 21,	Dec. 7.
Orange,	Franklin,	1905,	L. L. Gerry,	June 8, 1905,	Aug. 10,	Oct. 21.
Orleans,	Barnstable,	1905,	C. H. Howes,	May 18, 1905,	June 5,	July 22.
Palmer,	Hampden,	1905,	A. C. Downs,	Sept. 21, 1905,	Oct. 4,	Nov. 28.
Pembroke,	Plymouth,	1905,	H. C. Holden,	Feb. 9, 1905,	Sept. 10,	Sept. 21.
Pembroke,	Plymouth,	1905,	W. P. Hammersley,	Feb. 9, 1905,	Sept. 21,	Nov. 4.
Phillipston,	Worcester,	1904,	L. L. Gerry,	Nov. 17, 1904,	May 15,	Dec. 9.
Pittsfield,	Berkshire,	1904,	G. R. Brown,	Aug. 25, 1904,	April 27,	May 24.
Pittsfield,	Berkshire,	1905,	A. L. Southworth,	May 4, 1905,	July 24,	Sept. 1.

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Pittsfield,	Berkshire,	1894–5,	G. R. Brown,	Aug. 17, 1905,	Sept. 11,	Oct. 17.
Plymouth,	Plymouth,	1904,	W. P. Hammersley,	Dec. 1, 1904,	Mar. 28,	June 30.
Quincy,	Norfolk,	1904,	W. P. Hammersley,	Aug. 25, 1904,	April 10,	June 6.
Quincy,	Norfolk,	1897,	W. P. Hammersley,	Aug. 17, 1905,	Nov. 10,	Dec. 9.
Rehoboth,	Bristol,	1905,	H. C. Holden,	May 18, 1905,	June 8,	July 28.
Richmond,	Berkshire,	1905,	G. R. Brown,	Aug. 31, 1905,	Sept. 25,	Nov. 25.
Rockland,	Plymouth,	1905,	W. P. Hammersley,	Sept. 27, 1905,	Oct. 10,	Dec. 13.
Rowley,	Essex,	1905,	G. D. Marshall,	July 13, 1905,	Oct. 16,	Nov. 28.
Rutland,	Worcester,	1904,	C. A. Welton,	Dec. 22, 1904,	April 17,	Aug. 21.
Salisbury,	Essex,	1904,	C. H. Norton,	Sept. 8, 1904,	May 1,	Sept. 26.
Salisbury,	Essex,	1905,	C. H. Norton,	June 1, 1905,	June 15,	Sept. 26.
Shrewsbury,	Worcester,	1904,	A. D. Dudley,	July 29, 1904,	April 7,	May 12.
Somerset,	Bristol,	1905,	W. G. Addis,	Nov. 17, 1904,	April 7,	May 17.
Southampton,	Hampshire,	1905,	F. H. Everett,	Aug. 10, 1905,	Sept. 8,	Nov. 4.
Southborough,	Worcester,	1905,	F. H. Everett,	Oct. 12, 1905,	Nov. 6,	Nov. 9.
Sterling,	Worcester,	1905,	F. H. Cunningham,	Aug. 31, 1905,	Oct. 5,	Nov. 14.
Sterling,	Worcester,	1905,	F. H. Everett,	Aug. 31, 1905,	Nov. 14,	Nov. 24.
Stockbridge,	Berkshire,	1905,	G. R. Brown,	May 11, 1905,	May 22,	Aug. 12.
Stoughton,	Norfolk,	1905,	H. C. Holden,	Aug. 3, 1905,	Aug. 16,	Sept. 13.
Stoughton,	Norfolk,	1905,	D. H. Dickinson,	Aug. 3, 1905,	Sept. 18,	Dec. 21.
Sturbridge,	Worcester,	1905,	A. C. Downs,	April 20, 1905,	May 11,	June 10.
Sturbridge,	Worcester,	1905,	D. H. Winslow,	April 20, 1905,	June 10,	Sept. 22.
Sturbridge,	Worcester,	1897,	D. H. Winslow,	July 13, 1905,	Sept. 1,	Sept. 26.
Sunderland,	Franklin,	1904,	L. L. Gerry,	Sept. 29, 1904,	May 12,	June 27.
Swampscott,	Essex,	1897,	F. H. Morris,	Aug. 10, 1905,	Sept. 6,	Oct. 11.
Taunton,	Bristol,	1905,	H. C. Holden,	July 13, 1905,	Aug. 19,	Nov. 23.
Templeton,	Worcester,	1905,	L. L. Gerry,	Sept. 14, 1905,	Sept. 27,	Dec. 5.
Tewksbury,	Middlesex,	1904,	G. D. Marshall,	Aug. 11, 1904,	April 19,	May 17.
Tewksbury,	Middlesex,	1905,	C. A. Raymond,	June 15, 1905,	July 11,	Aug. 4.
West Brookfield,	Worcester,	1905,	A. C. Downs,	July 6, 1905,	Aug. 1,	Nov. 24.
West Newbury,	Essex,	1904–5,	C. H. Norton,	Sept. 21, 1905,	Oct. 16,	Dec. 16.
Westport,	Bristol,	1894,	W. G. Addis,	Aug. 17, 1905,	Oct. 11,	Nov. 6.
West Springfield,	Hampden,	1905,	G. R. Brown,	Oct. 5, 1905,	Oct. 30,	Nov. 21.
Whately,	Franklin,	1905,	P. H. Everett,	Sept. 14, 1905,	Sept. 29,	Nov. 11.
Whately,	Franklin,	1905,	L. L. Gerry,	Sept. 14, 1905,	Nov. 11,	Nov. 28.
Wilbraham,	Hampden,	1904,	A. C. Downs,	Aug. 4, 1904,	June 6,	Aug. 30.
Worcester,	Worcester,	1905,	C. A. Welton,	June 29, 1905,	July 11,	Oct. 24.

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Appendix C.

Showing Contract Prices on

	Town or City.	Contract Number.	Contractor.	Excavation.			Portland Cement Concrete Masonry.	Sloping (Square Yard).
				All Kinds (Cubic Yard).	Borrow (Cubic Yard).	Ledge (Cubic Yard).		
1	Abington,	915	Edward J. Rourke,	$0 50	$0 50	$1 50	$8 50	$0 05
2	Attleborough,	910	Lane Quarry Co.,	–	–	–	–	–
3	Auburn,	911	Amos D. Bridge,	30	40	2 50	8 00	02
4	Becket,	902	John W. Polcaro,	90	90	90	8 00	–
5	Bellingham,	906	Town,	45	50	1 50	8 00	03
6	Bellingham-Blackstone,	957	Town of Bellingham,	50	40	–	7 00	05
7	Beverly,	881	Frank Williams,	32	35	2 75	6 75	–
8	Beverly,	882	Connolly Bros.,	45	60	2 00	8 00	–
9	Beverly,	890	John A. Gaffey,	50	60	1 75	8 00	02
10	Beverly,	958	Fred E. Ellis,	–	–	–	–	–
11	Bourne,	903	Town,	30	35	2 00	9 00	05
12	Boxborough,	953	Bruno & Milano,	40	55	2 15	9 00	–
13	Bridgewater,	886	William Shea & Son,	35	50	10	6 00	03
14	Brookfield,	876	Lane Construction Corp.,	45	50	1 50	7 00	03
15	Brookfield,	916	Town,	50	60	1 75	8 00	05
16	Burlington,	948	Richmond F. Hudson,	45	60	2 00	10 00	05
17	Canton,	949	Joseph J. Moebs,	38	40	2 00	7 00	05
18	Charlton,	939	Richmond F. Hudson,	50	–	2 00	8 00	03
19	Chatham,	887	Town,	30	35	–	9 00	05
20	Chester,	908	Michael L. Camarco,	29	–	1 40	5 75	02
21	Chicopee,	888	City,	40	70	–	8 00	05
22	Chicopee,	950	Olin T. Benedict,	–	–	–	–	–
23	Chilmark,	880	Luigi C. Carchia,	26	50	2 50	7 00	02
24	Clarksburg,	922	John W. Polcaro,	40	1 05	1 25	7 00	02

[1] Ten-inch clay. [2] Fifteen-inch clay. [3] Ten-inch iron.
[7] Gravel for surfacing. [8] Eight-inch iron. [9] Clay hardening.

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APPENDIX C.

STATE ROADS DURING 1905.

Broken Stone.		Pipe Culverts (per Lineal Foot).						Fencing (Lineal Foot).	Side Drains (Lineal Foot).	Stone Filling for Underdrains (per Cubic Yard).	Bounds (Each).	Catch-basins (Each).	
		Clay.			Iron.								
Local (Ton).	Trap (Ton).	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.						
$1 55	-	[4]$0 50	[5]$1 25	-	[6]$2 00	-	-	$0 25	-	$0 60	$2 00	$25 00	1
-	$2 03	-	-	-	-	-	-	-	-	-	-	-	2
1 41	-	75	-	-	-	-	-	25	-	-	2 00	-	3
-	-	90	-	-	2 25	$3 75	-	25	-	-	2 00	-	4
1 30	-	75	-	-	2 00	-	-	25	-	-	1 50	25 00	5
-	1 96	75	-	-	2 00	-	-	25	-	-	1 50	-	6
45	-	75	1 00	[7]$0 65 / [8]$1 00	2 00	3 00	[9]$2 00	25	-	-	2 00	10 00	7
35	-	65	1 15	[10]60	2 00	[11]1 70	-	25	[4]$1 00	960	1 25	17 00	8
63	-	70	1 40	[10]58	-	-	-	-	[4]1 00	840	1 40	24 00	9
-	2 09	-	-	-	-	-	-	-	-	-	-	-	10
2 10	-	75	950	-	-	-	-	25	-	-	1 50	25 00	11
-	-	60	-	-	2 25	-	-	25	765	65	2 25	-	12
1 30	-	1 00	[10]80	950	2 25	[11]2 00	$1 50	25	-	75	1 50	25 00	13
-	1 75	65	-	-	1 75	-	-	25	-	70	1 75	-	14
-	1 83	-	-	-	-	-	-	25	-	75	1 50	-	15
1 45	-	80	1 50	-	2 50	-	-	25	-	-	2 00	25 00	16
1 54	-	1 00	1 50	[11]1 25	-	-	-	25	-	-	1 50	25 00	17
1 00	-	70	-	-	2 25	-	-	30	-	70	2 00	-	18
-	2 45	75	950	-	-	-	-	25	-	965	1 50	25 00	19
1 20	1 70	-	-	-	2 50	-	-	25	-	-	1 95	-	20
-	2 30	75	950	-	2 50	-	-	-	-	-	1 50	25 00	21
-	2 04	-	-	-	-	-	-	-	-	-	-	-	22
1 10	-	80	[11]1 75	-	2 00	[10]3 00	-	26	-	963	2 10	25 00	23
1 25	2 10	70	-	-	2 00	-	-	30	40	[11]1 02	2 00	20 00	24

[4] Cobble-stone gutter.
[5] Cobble-stone gutters to be relaid.
[6] Eight-inch clay.
[7] Sixteen-inch iron.
[8] Unscreened broken stone.

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SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Contract Number.	Contractor.	EXCAVATION. All Kinds (Cubic Yard).	EXCAVATION. Borrow (Cubic Yard).	EXCAVATION. Ledge (Cubic Yard).	Portland Cement Concrete Masonry.	Stripping (Square Yard).
1	Colrain,	933	David T. Perry,	$0 40	$0 45	$2 00	$9 50	$0 02
2	Concord,	934	William Shea & Son,	40	50	1 50	7 00	03
3	Concord (bridge),[4]	940	Globe Construction Co.,	–	–	–	–	–
4	Dartmouth,	891	The H. Gore Co.,	35	40	1 00	5 00	02
5	Deerfield,	928	Hammond & Walsh,	40	50	2 00	6 00	02
6	Douglas,	959	Charles E. Horne,	43	–	1 25	8 00	03
7	Dover,	904	Town,	55	55	1 75	8 00	–
8	Dracut,	969	Michael L. Camarco,	33	39	1 55	6 50	02
9	Duxbury,	892	Warren R. Keith,	35	–	01	9 00	03
10	Erving	900	Bruno & Milano,	–	–	–	–	–
11	Falmouth (Waquoit road).	912	Lane Quarry Co.,	50	50	–	8 00	03
12	Falmouth (Bourne road).	954	Charles H. Thomas,	–	–	–	–	–
13	Foxborough,	944	Town,	40	50	2 00	9 00	03
14	Framingham,	896	Town,	55	60	2 00	8 00	03
15	Franklin,	921	Town,	35	45	1 50	8 00	03
16	Gloucester,	951	Daniel E. Lynch,	50	65	2 25	10 00	03
17	Grafton,	929	Town,	40	40	1 75	8 00	03
18	Grafton (bridge),	930	Town,	2 00	50	–	16 00	–
19	Granby,	894	W. N. Flynt Granite Co.,	40	45	1 00	8 00	03
20	Great Barrington,	917	Olin T. Benedict,	–	–	–	–	–
21	Greenfield,	926	Town,	45	50	1 75	8 00	–
22	Groveland,	960	James E. Watkins,	45	55	–	8 00	03
23	Hadley,	935	Lane Construction Corp.,	–	–	–	–	–
24	Harvard,	879	Ferranti & Maguire Co.,	34	75	1 25	7 00	02
25	Holden,	945	Town,	50	55	2 00	8 00	03
26	Kingston,	961	Lane Quarry Co.,	40	50	2 00	10 00	03
27	Lancaster-Sterling,	946	Worcester Broken Stone Co.	50	55	–	9 00	03
28	Leominster,	970	Olin T. Benedict,	–	–	–	–	03
29	Milford,	889	Snow & Farrington,	40	60	2 00	9 00	02
30	Monson,	905	W. N. Flynt Granite Co.,	50	50	1 50	8 00	03
31	Needham,	897	Town,	60	60	2 00	9 00	03
32	Newbury,	918	James E. Watkins,	35	[12]38	1 25	[13]8 00 7 00 [14]10 00	[15]5 25

[1] Screened gravel. [2] Fifteen-inch clay. [3] Ten-inch iron.
[7] Local ledge stone. [8] Ten-inch clay. [9] Eight-inch clay.
[13] Cement concrete masonry for foundations. [14] Class B masonry.

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STATE ROADS DURING 1905 — *Continued.*

Broken Stone.		Pipe Culverts (per Lineal Foot).						Fencing (Lineal Foot).	Side Drains (Lineal Foot).	Stone Filling for Underdrains (per Cubic Yard).	Rounds (Each).	Catch-basins (Each).	
		Clay.			Iron.								
Local (Ton).	Trap (Ton).	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.						
–	–	$0 75	–	–	$2 25	–	–	$0 25	–	[1]$2 25	$2 00	$30 00	1
–	$1 65	90	[2]$1 25	–	2 25	[2]$2 00	–	25	–	1 00	1 50	25 00	2
–	–	–	–	–	–	–	–	–	–	–	–	–	3
$1 25	–	[3]1 25	1 25	–	–	–	–	25	[2]$0 20	50	2 00	–	4
–	1 70	75	–	–	1 90	–	–	30	–	–	1 50	–	5
1 48	–	70	–	–	2 25	–	–	25	–	90	1 75	–	6
–	–	75	–	–	2 00	–	–	25	–	[6]60	2 50	–	7
1 44	–	80	1 10	–	2 50	–	–	25	–	–	2 00	25 00	8
[7]1 60	–	75	[6]60	[2]$0 50	–	–	–	25	–	–	1 00	25 00	9
–	2 10	–	–	–	–	–	–	–	–	–	–	–	10
–	2 73	[6]60	–	–	–	–	–	–	–	–	2 00	25 00	11
–	2 15	[6]40	–	–	–	–	–	40	–	–	–	35 00	12
1 47	–	75	[6]50	–	–	–	–	25	–	–	1 50	25 00	13
{ 1 25 / [10]1 10 }	–	75	1 10	–	2 00	–	–	25	–	85	1 50	–	14
1 45	–	70	–	–	2 00	–	–	25	–	–	1 50	25 00	15
1 70	–	80	1 65	{ [8]78¢ / [9]1 15 }	–	–	–	25	–	–	2 00	25 00	16
–	2 00	60	–	–	–	–	–	25	–	60	1 50	25 00	17
–	–	–	–	–	–	–	–	[11]1 00	–	–	–	–	18
–	2 25	60	–	–	–	–	–	25	50	–	1 50	–	19
–	2 24	–	–	–	–	–	–	–	–	–	–	–	20
–	–	[6]60	–	–	–	–	–	25	–	[6]90	1 75	–	21
–	1 92½	80	[6]55	–	[3]1 80	–	–	–	52½	–	1 50	22 50	22
–	1 79	–	–	–	–	–	–	–	38	–	–	–	23
1 26	–	75	1 50	–	–	–	–	23	45	80	2 00	25 00	24
1 45	–	75	1 40	–	2 00	–	–	25	–	80	1 50	–	25
–	2 05	[6]55	[6]60	–	–	–	–	25	–	–	2 00	25 00	26
1 50	–	80	–	–	2 00	–	–	25	–	–	2 00	–	27
1 22½	–	–	–	–	–	–	–	–	50	–	–	–	28
1 40	–	1 00	1 50	–	–	–	–	25	–	85	1 25	–	29
–	2 05	1 00	–	1 75	2 00	–	[4]4 00	25	–	–	2 00	–	30
[7]1 40	–	75	–	–	2 00	–	–	25	–	–	2 00	–	31
–	–	70	[3]1 35	–	2 00	–	–	24	–	50	1 50	–	32

[4] Lump sum, $9,520.
[6] Cobble-stone gutter.
[8] Gravel for surfacing.
[10] From pile at crusher.
[11] Iron fence.
[12] Unscreened gravel.
[15] Spruce pile.

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SHOWING CONTRACT PRICES ON

	TOWN OR CITY.	Contract Number.	Contractor.	EXCAVATION.				
				All Kinds (Cubic Yard).	Borrow (Cubic Yard).	Ledge (Cubic Yard).	Portland Cement Concrete Masonry.	Blueprint (Square Yard).
1	North Adams,	936	Olin T. Benedict,	–	–	–	–	–
2	Northampton,	884	Lane Construction Corp.,	$0 30	–	$1 75	$8 00	–
3	Northampton,	931	Olin T. Benedict,	40	$0 50	–	9 00	$0 02
4	North Brookfield,	952	Lane Construction Corp.,	50	45	1 50	8 00	03
5	Orange,	906	Town,	35	1 50	–	–	03
6	Orleans,	898	Town,	25	35	2 00	8 00	03
7	Palmer,	962	Rowe & Perrini,	29	–	1 50	7 00	–
8	Pembroke,	875	Town,	45	55	2 00	8 00	02½
9	Pittsfield,	941	Olin T. Benedict,	–	–	–	–	–
10	Pittsfield-Lenox,	893	Richmond F. Hudson,	40	60	1 00	8 00	02½
11	Quincy,	942	Lane Quarry Co.,	–	–	–	–	–
12	Rehoboth,	899	Town,	30	35	2 00	8 00	02
13	Richmond,	947	Town,	45	50	2 00	7 00	–
14	Rockland,	903	Town,	40	50	2 00	9 00	03
15	Salisbury,	901	Thomas F. O'Neil,	25	33	1 50	6 00	02
16	Southampton,	937	Lane Construction Corp.,	40	45	1 00	8 00	–
17	Southborough,	968	Luigi C. Carchia,	30	50	2 50	6 20	02
18	Stockbridge,	895	Hammond & Walsh,	40	75	1 20	8 00	02
19	Stoughton,	932	Edward J. Rourke,	40	50	1 00	8 00	03
20	Sturbridge,	885	Amos D. Bridge,	40	55	1 50	8 00	03
21	Sturbridge,	919	Amos D. Bridge,	–	55	–	–	–
22	Swampscott,	938	Wm. Shea & Son,	–	–	–	–	–
23	Taunton,	920	City,	45	50	2 00	9 00	03
24	Templeton,	955	Amos D. Bridge,	35	45	1 00	8 00	03
25	Tewksbury,	909	Fred E. Ellis,	1 84	48	1 00	9 50	03
26	Wareham,	964	Fred E. Ellis,	60	70	1 00	8 00	03
27	West Brookfield,	914	Olin T. Benedict,	40	40	2 00	8 00	02
28	West Newbury,	965	Thomas F. O'Neil,	35	50	2 00	9 00	02
29	Westport,	943	Lane Quarry Co.,	–	–	–	–	–
30	West Springfield,	967	Town,	40	50	1 50	8 00	03
31	Whately,	956	Amos D. Bridge,	30	40	–	8 00	02
32	Worcester,	913	Charles E. Horne,	40	65	2 00	8 00	02½

[1] Eight-inch clay. [2] Eight-inch iron. [3] Ten-inch clay.
[7] Guard rail to be rebuilt. [8] Gravel for surfacing. [9] Stone from Hingham quarries.

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STATE ROADS DURING 1905— *Concluded.*

Broken Stone.		Pipe Culverts (per Lineal Foot).						Fencing (Lineal Foot).	Side Drains (Lineal Foot).	Stone Filling for Underdrains (per Cubic Yard).	Bounds (Each).	Catch-basins (Each).	
		Clay.			Iron.								
Local (Ton).	Trap (Ton).	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.						
-	$2 09	-	-	-	-	-	-	-	-	-	-	-	1
-	-	$0 90	-	-	$1 75	-	-	$0 22	-	-	$1 50	-	2
-	1 75	60	$0 50	-	2 00	$1 50	-	25	-	-	2 00	$30 00	3
-	1 75	75	-	-	2 00	-	-	25	-	$0 75	2 00	-	4
-	1 85	85	[a]75	-	-	-	-	-	-	-	1 50	25 00	5
$1 90	-	145	-	-	-	-	-	25	-	-	1 00	25 00	6
-	-	95	-	-	-	-	-	25	-	-	60	32 00	7
1 45	-	75	$65	$0 45	2 00	-	-	25	$0 40	-	1 50	25 00	8
-	2 14	-	-	-	-	-	-	-	-	-	-	-	9
1 30	-	70	-	-	2 00	[b]2 00	-	25	-	65	2 00	25 00	10
-	2 20	-	-	-	-	-	-	-	-	-	-	-	11
1 47	-	75	150	$65 / $1 25	[a]2 00	-	-	25	-	-	1 50	25 00	12
-	-	70	-	-	2 00	-	-	25	[c]1 25	75	2 00	-	13
1 75	-	75	150	[c]1 25	2 00	-	-	25	-	-	1 50	25 00	14
93	-	140	-	-	-	-	-	$19 / 24	-	-	75	20 00	15
-	-	70	-	-	2 00	-	-	25	-	-	1 50	-	16
1 30	-	75	-	-	3 00	-	-	-	-	-	1 25	-	17
1 50	2 05	-	-	-	1 90	2 90	-	25	-	60	2 00	20 00	18
1 40	-	150	1 50	-	-	-	-	25	-	-	2 00	25 00	19
1 85	-	75	-	-	2 00	-	-	25	-	75	2 00	-	20
1 50	-	-	-	-	-	-	-	-	-	-	-	-	21
-	-	-	-	-	-	-	-	-	-	[d]90	-	-	22
1 55	-	75	[c]1 25	150	-	-	-	25	-	75	1 50	25 00	23
-	1 93	70	-	-	2 00	-	-	25	-	-	1 50	-	24
1 25	-	75	-	-	-	-	-	25	-	-	2 00	-	25
1 49	-	150	[d]90	-	[c]1 50	-	-	30	-	-	1 50	28 00	26
-	1 80	75	-	-	-	-	-	25	-	-	2 00	25 00	27
1 49	-	$74 / 55	90	1 90	-	-	-	29	47	-	2 00	25 00	28
-	[e]2 35	-	-	-	-	-	-	-	-	-	-	-	29
-	1 70	-	-	-	-	-	-	30	-	-	2 00	-	30
-	1 75	90	-	-	2 00	-	-	25	-	-	1 50	-	31
-	1 96	65	-	-	2 00	-	-	25	-	83	2 00	-	32

[a] Ten-inch iron. [b] Fifteen-inch clay. [c] Screened gravel.

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APPENDIX D.

STATEMENT OF CLAIMS AGAINST THE COMMISSION.

[As required by Section 5, Chapter 18 of the Revised Laws.]

NAME.	Residence.	Nature of Claim.
Barnes, George H., Barnes, Wm., 2d,	Marlborough,	Damages caused by construction of State road at Marlborough.
Bennett, J. C.,	Lynn,	Damages caused by taking of land at Lynn.
Brennan, Ann M.,	Westport,	Damages due to alleged accident on State road in Westport.
Brown, Mary,	Westfield,	Damages due to alleged accident on State road in Russell.
Chase, Charles A.,	Somerset,	Damages caused by drainage conditions on State road in Somerset.
Crowell, T. H.,[1]	Somerville,	Damages caused by construction of State road at Chatham.
Daly, Julia M.,[1]	Abington,	Damages caused by construction of State road at Abington.
Donovan, J. H.,[1]	Natick,	Damages caused by construction of State road at Natick.
Green, Arthur E.,	Westfield,	Damages due to alleged accident on State road at Russell.
Griffin, John, *et al.*,	Natick,	Damages due to construction of State road at Natick.
Lynch, George, *et al.*,[1]	Somerset,	Damages due to construction of State road at Somerset.
McIntyre, Bernard,[1]	Abington,	Damages due to construction of State road at Abington.
Pierce, Alice,	Topsfield,	Damages due to alleged accident on State road in Wenham.
Salem Savings Bank,	Salem,	Damages caused by taking of land at Lynn.
Seabury, Phoebe W.,	Dartmouth,	Damages due to construction of State road at Dartmouth.
Sullivan, John,	Westfield,	Damages due to alleged accident on State road at Russell.
Thimineur, Joseph,[1]	Marlborough,	Damages due to construction of State road at Marlborough.
Warren, Alice E. M.,[1]	Auburn,	Damages due to construction of State road at Auburn.
Williams, Joseph,	Somerset,	Damages due to construction of State road in Somerset.

[1] The municipality is defending the action.

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APPENDIX E.

COST PER MILE OF ROAD (SECTIONS COMPLETED DURING THE YEAR 1905).[1]

TOWN OR CITY.	Square Yards.	Miles.	Cost per Mile.
Abington,	4,221	.480	$5,540 40
Barnstable,	13,000	1.477	2,085 38
Becket,[2]	6,627	.538	6,373 40
Bellingham,	8,578	.975	4,349 90
Bourne,	10,008	1.135	2,529 05
Bridgewater,	6,167	.700	5,755 83
Brookfield, 1904,	7,475	.849	7,678 00
Brookfield, 1905,	3,447	.392	9,137 45
Burlington,	7,753	.881	7,014 27
Charlton,	2,715	.309	8,831 84
Chatham,	11,902	1.332	4,757 99
Chelmsford,[3]	7,328	.694	10,564 57
Chester,	3,500	.400	14,700 90
Chicopee,[3]	4,530	.429	10,294 08
Chilmark,[4]	7,987	1.132	4,032 37
Colrain,[5]	3,732	.303	7,051 88
Clarksburg,	5,285	.600	7,460 00
Dartmouth,[3]	7,308	.692	6,891 53
Deerfield, 1904,	3,975	.452	9,393 37
Deerfield, 1905,	3,703	.421	7,793 84
Duxbury,	8,983	1.021	4,490 64
Falmouth,	4,863	.553	7,187 90
Foxborough,	9,000	1.023	4,195 08
Framingham,	10,105	1.156	4,779 10
Franklin,	6,417	.730	6,074 13
Granby,	3,787	.430	12,729 40
Greenfield,[3]	3,222	.262	3,337 35
Harvard,	7,735	.880	8,893 98
Lenox,	22,365	2.542	3,005 28
Lenox-Pittsfield,	11,185	1.271	3,524 50
Littleton,[3]	12,697	1.023	3,061 57
Milford, 1904,	10,333	1.174	4,754 21
Milford, 1905,	5,026	.571	5,292 50
Monson,	2,584	.293	7,639 30
Newbury,[5]	10,346	.840	5,249 90
Northampton (1),[3]	10,585	.860	9,447 97
Northampton (2),	3,042	.346	9,966 30
Northborough,	7,267	.826	4,902 88
North Brookfield,	4,415	.502	10,641 29
Orange,	490	.056	12,590 71
Orleans,[4]	3,320	.472	4,224 40
Pembroke,	3,085	.350	5,524 83
Plymouth,	6,787	.771	4,772 94
Quincy,	10,843	1.232	7,134 71
Rehoboth,	8,130	.924	4,542 23
Richmond,[3]	5,481	.445	4,026 60
Rockland,	8,000	.909	4,764 19
Rutland,	10,205	1.160	6,760 99
Salisbury, 1904,[6]	8,400	.682	7,900 88
Salisbury, 1905,[6]	4,296	.349	9,514 29
Shrewsbury,	8,467	.962	6,380 93

[1] Exclusive of cost of bridges and engineering charges.
[2] Grading only.
[3] Macadam 18 feet in width.
[4] Macadam 12 feet in width.
[5] Gravel road.
[6] Macadam 21 feet in width.

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COST PER MILE OF ROAD, ETC. — *Concluded.*

TOWN OR CITY.	Square Yards.	Miles.	Cost per Mile.
Somerset, 1904,	6,044	.663	$7,037 49
Somerset, 1905,	4,867	.553	6,784 53
Southampton,[1]	8,162	.659	6,440 12
Stockbridge,	4,830	.549	5,916 90
Sturbridge,	6,872	.794	9,281 03
Sunderland,	2,000	.227	11,453 09
Taunton,	9,190	1.069	4,884 85
Tewksbury,	7,013	.800	6,029 75
Wellfleet,[2]	17,512	2.487	2,493 42
West Brookfield,	8,955	1.018	4,750 10
West Tisbury,	13,310	1.513	4,092 62
Weymouth,[3]	8,507	.967	2,757 36
Wilbraham,	20,445	1.187	7,969 04
Worcester,	5,955	.677	9,134 24
Totals,	474,254	51.969	-
Average cost per mile,			$5,708 88

[1] Gravel road. [2] Macadam 12 feet in width. [3] Partly gravel; partly macadam.

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APPENDIX F.

MAINTENANCE.

Table showing the Amounts expended for Repairs and Maintenance and the Cost per Mile per Year on Each Road finished previous to 1906; also the Number of Miles of Road under Maintenance and the Amounts to be assessed upon Municipalities for Maintenance under Chapter 47 of the Revised Laws.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns.
Abington,	$215 37	$69 64	$285 01	$44 25	$31 54	2.208	$69 64
Acton,	634 46	244 15	878 61	40 98	55 10	4.431	221 55
Acushnet,	1,122 09	163 22	1,285 31	92 53	48 08	3.395	163 22
Adams,	480 30	27 96	508 26	114 47	49 23	.568	27 96
Agawam,	8 65	11 24	19 89	9 25	9 77	1.150	11 24
Amesbury,	500 24	229 88	730 12	117 19	102 49	2.243	112 15
Amherst,	74 40	212 45	286 85	90 52	218 80	.971	48 55
Andover,	1,559 17	285 86	1,845 03	75 12	68 19	4.192	209 60
Ashby,	2,677 01	374 36	3,051 37	102 12	104 83	3.571	178 55
Ashfield,	1,292 88	289 33	1,582 21	138 91	179 93	1.608	80 40
Ashland,	51 20	49 10	100 30	48 22	33 33	1.473	49 10
Athol,	5,482 63	238 39	5,721 02	358 39	107 19	2.224	111 20
Attleborough,	516 22	213 28	729 50	71 17	80 45	2.651	132 55
Auburn,	2,030 64	357 90	2,388 54	86 35	68 00	5.263	263 15
Barnstable,	1,371 78	336 81	1,708 59	84 24	59 15	5.694	284 70
Barre,	554 33	156 87	711 20	50 83	54 26	2.891	144 55
Becket,	19 53	150 11	169 64	89 28	93 58	1.604	80 20
Bedford,	155 47	54 55	210 02	38 47	48 84	1.117	54 55
Belchertown,	256 80	169 38	426 18	81 96	123 64	1.370	68 50
Bellingham,	9 00	10 20	19 20	12 71	7 53	1.354	10 20
Beverly,	3,066 71	2,477 91	5,544 62	306 50	504 36	4.913	245 65
Blackstone,	478 60	153 96	632 56	82 26	88 43	1.741	87 05

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Table showing the Amounts expended for Repairs, etc. — Continued.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns.
Bourne,	$439 45	$119 56	$559 01	$55 24	$28 59	4.182	$119 56
Boxborough,	247 41	71 57	318 98	22 76	52 51	1.363	68 15
Braintree,	49 29	27 82	77 11	19 92	26 22	1.061	27 82
Brewster,	2,925 86	807 59	3,733 45	83 79	103 72	7.786	389 30
Bridgewater,	107 08	17 20	124 28	65 41	8 33	2.065	17 20
Brimfield,	1,185 26	274 69	1,459 95	70 19	69 26	3.966	198 30
Brockton,	862 22	168 67	1,030 89	62 74	52 94	3.186	159 30
Brookfield,	675 61	219 01	894 62	78 89	62 48	3.505	175 25
Buckland,	2,747 18	621 26	3,368 44	32 19	157 92	3.[illegible]04	196 70
Burlington,	116 89	131 12	248 01	74 93	67 55	1.941	97 05
Charlemont,	3,420 91	156 99	3,577 90	641 20	204 68	.767	38 35
Charlton,	70 26	169 43	239 69	43 19	76 25	2.222	111 10
Chatham,	688 41	152 80	841 21	116 35	89 99	1.698	84 90
Chelmsford,	594 92	169 58	764 50	77 07	62 58	2.710	135 50
Chelsea,	17 25	3 72	20 97	10 33	6 44	.578	3 72
Cheshire,	679 42	180 99	860 41	70 55	69 75	2.595	129 75
Chester,	1,123 79	284 70	1,408 49	172 61	87 73	3.243	162 25
Chicopee,	3,283 09	2,942 32	6,225 39	653 91	1,063 35	2.767	138 35
Chilmark,	–	7 28	7 28	80 89	6 43	1.132	7 28
Cohasset,	268 75	64 19	332 94	28 53	28 14	2.281	64 19
Colrain,	712 81	251 74	964 55	102 61	137 56	1.830	91 50
Concord,	693 00	141 26	834 26	63 19	70 98	1.990	99 50
Cottage City,	3,586 01	171 14	3,757 15	164 93	73 21	2.370	118 50
Dalton,	3,816 83	395 39	4,212 22	269 32	154 69	2.556	127 80
Dartmouth,	500 66	37 80	538 46	36 16	8 33	4.540	37 80
Deerfield,	4,653 77	266 86	4,920 63	252 85	78 35	3.406	170 30
Dennis,	3,089 01	484 23	3,573 24	81 96	72 55	6.674	333 70
Dighton,	56 69	20 54	77 23	19 70	13 14	1.563	20 54
Douglas,	157 16	238 68	395 84	136 03	150 11	1.560	79 50
Dudley,	232 78	206 42	439 20	104 45	196 59	1.050	52 50
Duxbury,	1,172 46	198 99	1,371 45	74 05	51 53	3.862	193 10
East Longmeadow,	2 78	18 06	20 84	25 73	30 87	.585	18 06
Eastham,	505 47	326 04	831 51	319 81	200 03	1.630	81 50
Easthampton,	1,215 87	162 08	1,377 95	79 05	68 02	2.383	119 15

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Table showing the Amounts expended for Repairs, etc. — Continued.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns.
Easton, . . .	$136 15	$30 17	$166 32	$41 89	$37 67	.801	$30 17
Edgartown, . .	491 96	129 67	621 63	58 26	53 67	2.416	120 80
Erving, . . .	1,123 16	123 54	1,246 70	109 93	60 44	2.044	102 20
Essex, . . .	4 70	100 57	105 27	133 25	288 17	.349	17 45
Fairhaven, . .	667 88	59 57	727 45	49 32	41 11	1.449	59 57
Falmouth, . .	–	190 79	190 79	18 65	16 33	11.686	190 79
Fitchburg, . .	2,907 79	1,445 54	4,353 33	207 70	351 63	4.118	205 90
Foxborough, . .	83 79	72 78	106 57	18 92	40 08	1.816	72 78
Freetown, . .	126 81	74 47	201 28	27 84	23 32	3.193	74 47
Gardner, . . .	1,750 22	549 14	2,299 36	106 60	163 63	3.356	167 80
Gloucester, . .	3,758 24	272 95	4,031 19	191 78	109 88	2.484	124 20
Goshen, . . .	2,392 10	369 91	2,762 01	147 31	193 97	1.907	95 35
Grafton, . . .	702 43	55 80	758 23	73 89	35 93	1.553	55 80
Granby, . . .	1,278 90	419 78	1,698 68	216 70	287 13	1.462	73 10
Great Barrington, .	6,517 04	1,173 98	7,691 02	295 12	344 17	3.411	170 55
Greenfield, . .	382 70	140 62	523 32	75 19	70 49	1.995	99 75
Groton, . . .	157 71	94 05	251 76	61 11	68 05	1.382	69 10
Groveland, . .	113 05	95 82	208 87	45 41	66 54	1.440	72 00
Hadley, . . .	3,686 93	423 41	4,110 34	160 43	90 30	4.689	234 45
Hamilton, . .	589 60	132 29	721 89	93 63	91 80	1.441	72 05
Hancock, . . .	4,998 49	762 00	5,760 49	237 94	235 77	3.232	161 60
Hardwick, . .	328 66	69 72	398 38	83 87	85 13	.819	40 95
Harvard, . . .	72 61	121 04	193 65	60 14	76 51	1.582	79 10
Harwich, . . .	982 90	438 15	1,421 05	74 00	85 95	5.098	254 90
Hatfield, . . .	74 34	14 40	88 74	64 77	37 11	.388	14 40
Haverhill, . .	6,553 76	133 37	6,687 13	453 12	42 37	3.148	133 37
Hingham, . .	1,068 82	143 35	1,212 17	49 45	53 93	2.658	132 90
Hinsdale, . . .	64 45	33 18	97 63	35 50	32 63	1.017	33 18
Holbrook, . .	626 49	58 86	685 35	56 59	33 62	1.751	58 86
Holden, . . .	1,878 46	102 71	1,981 17	62 26	27 31	3.761	102 71
Huntington, . .	5,977 91	178 54	6,156 45	636 00	116 16	1.537	76 85
Lakeville, . .	256 58	89 28	345 86	30 39	25 01	3.570	89 28
Lancaster, . .	136 74	56 58	193 32	48 80	45 30	1.249	56 58
Lawrence, . .	1,564 58	32 24	1,596 82	709 70	120 75	.267	13 35

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Table showing the Amounts expended for Repairs, etc. — Continued.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be expended under Chapter 377 of Acts of 1906.
Lee,	$7,551 05	$892 86	$8,443 91	$304 80	$275 32	3.243	$492 [illegible]
Leicester,	13,053 22	331 72	13,384 94	354 41	68 45	4.846	241 9
Lenox,	1,752 73	464 64	2,217 37	197 62	88 12	5.273	263 6
Leominster,	227 91	132 01	359 92	50 76	60 61	2.178	108 8
Lexington,	1,323 09	297 68	1,620 77	50 01	69 37	4.291	214 52
Lincoln,	859 82	240 50	1,100 32	60 29	116 75	2.066	103 [illegible]
Littleton,	157 40	119 08	276 48	63 85	45 52	2.616	130 8
Lowell (north),	399 05	73 27	472 32	525 48	148 99	2.303	115 15
Lowell (south),	8,648 28	269 85	8,918 13				
Lunenburg,	1,126 98	288 20	1,415 18	108 52	105 88	2.722	136 [illegible]
Lynn,	–	5 04	5 04	25 20	6 43	.784	5 04
Mansfield,	33 66	33 70	67 36	26 11	46 81	.720	36 [illegible]
Marion,	799 23	186 92	986 15	32 73	33 56	5.569	278 [illegible]
Marlborough,	618 30	142 97	761 27	37 57	25 90	5.521	142 [illegible]
Marshfield,	956 00	163 39	1,119 39	55 80	40 86	3.999	163 [illegible]
Mattapoisett,	706 86	83 29	790 15	405 20	25 98	3.206	83 29
Merrimac,	660 78	153 27	814 05	69 64	72 23	2.122	106 10
Methuen,	3,186 04	76 66	3,262 70	213 95	29 18	2.627	76 66
Middleborough,	819 03	155 57	974 60	26 92	17 36	8.959	155 57
Millbury,	223 97	107 73	331 70	57 09	44 96	2.396	107 73
Milton,	1,885 84	574 87	2,460 71	578 99	660 01	.871	43 55
Monson,	829 01	116 52	945 53	97 68	87 74	1.328	66 40
Montague,	659 60	254 09	913 69	78 69	102 54	2.478	123 90
Nantucket,	2,908 22	410 74	3,318 96	72 72	63 40	6.479	323 [illegible]
Natick,	60 85	79 75	140 60	19 66	24 92	3.200	79 75
Needham,	63 90	6 39	70 29	20 67	6 42	.995	6 39
New Braintree,	48 84	46 06	94 90	60 06	116 02	.397	19 85
Newbury,	387 19	172 10	559 29	48 50	51 04	3.372	168 60
Newburyport,	1,034 49	80 78	1,115 27	88 02	46 05	1.754	80 78
Newton,	18 02	6 63	24 65	5 85	6 42	1.032	6 63
Norfolk,	460 51	54 08	514 59	39 43	37 19	1.454	54 08
North Adams,	4,252 86	4,732 78	8,985 64	379 98	1,180 83	4.008	200 40
North Andover,	577 92	198 16	776 08	118 30	104 85	1.890	94 50
Northampton,	1,371 46	145 79	1,517 25	112 41	50 46	2.889	144 45

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Table showing the Amounts expended for Repairs, etc. — Continued.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns.
North Attleborough,	$1,935 50	$250 03	$2,185 53	$69 05	$69 51	3.597	$179 85
Northborough,	453 77	134 59	588 36	83 62	33 85	3.976	134 59
Northfield,	238 69	61 03	299 72	83 72	52 75	1.157	57 85
North Reading,	237 13	142 12	379 25	34 69	61 52	2.310	115 50
Norton,	864 85	26 61	891 46	64 60	37 06	.718	26 61
Norwood,	869 20	247 68	1,116 88	67 36	120 82	2.050	102 50
Orange,	2,234 01	354 29	2,588 30	101 46	73 86	4.797	239 85
Orleans,	268 29	158 10	426 39	50 16	38 16	4.143	158 10
Palmer,	777 65	235 94	1,013 59	78 88	93 89	2.513	125 65
Paxton,	6,060 49	105 81	6,766 30	217 85	29 42	3.597	105 81
Phillipston,	1,164 27	48 53	1,212 80	147 90	40 04	1.212	48 53
Pittsfield,	3,603 34	674 80	4,278 14	182 90	142 63	4.731	236 55
Plainville,	-	29 88	29 88	16 51	16 54	1.806	29 88
Plymouth,	3,297 80	352 86	3,650 66	104 21	70 26	5.022	251 10
Princeton,	520 55	44 37	564 92	67 49	19 91	2.229	44 37
Provincetown,	84 74	80 77	165 51	58 69	73 29	1.102	55 10
Quincy,	92 18	27 48	119 66	24 47	11 98	2.293	27 48
Randolph,	113 92	97 99	211 91	67 06	70 85	1.383	69 15
Raynham,	124 46	14 17	138 63	32 54	9 50	1.477	14 17
Reading,	628 35	231 53	859 88	83 97	61 97	3.736	186 80
Rehoboth,	910 84	150 57	1,061 41	62 55	42 85	3.514	150 57
Revere (east),	805 00	177 95	982 95	235 16	353 96	1.248	62 40
Revere (west),	1,596 00	263 79	1,859 79	504 01			
Richmond,	1,058 45	337 46	1,395 91	112 03	124 16	2.718	135 90
Rochester,	36 24	114 35	150 59	14 91	21 70	5.270	114 35
Rockland,	17 56	10 94	28 50	12 90	10 90	1.004	10 94
Rockport,	62 94	2 06	65 00	69 89	6 40	.322	2 06
Russell,	10,085 89	396 25	10,482 14	196 96	59 54	6.655	332 75
Rutland,	-	7 45	7 45	6 42	6 42	1.160	7 45
Salem,	1 75	85	2 60	4 73	6 39	.133	85
Salisbury,	-	9 30	9 30	38 75	6 43	1.447	9 30
Sandwich,	1,453 00	1,388 28	3,041 28	172 52	562 82	2.822	141 10
Saugus,	1,823 20	404 43	2,227 63	253 14	252 93	1.599	79 95
Scituate,	1,138 09	175 23	1,313 32	92 94	69 65	2.516	125 80

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Table showing the Amounts expended for Repairs, etc. — Continued.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns
Seekonk,	$84 80	$48 01	$132 81	$18 50	$17 41	2.757	$48 [illegible]
Shelburne,	4,038 04	326 48	4,364 52	218 12	151 22	2.159	107 [illegible]
Shrewsbury,	5,528 68	256 54	5,785 22	192 20	52 81	4.858	242 [illegible]
Somerset,	1,202 87	371 70	1,574 57	48 06	53 51	6.946	347 [illegible]
Southampton,	-	4 23	4 23	141 00	6 42	.659	4 [illegible]
Southborough,	3 61	7 20	10 81	10 70	9 49	.759	7 [illegible]
Southbridge,	15 46	34 02	49 48	18 12	37 43	.909	34 [illegible]
South Hadley,	3,528 80	762 15	4,290 95	195 58	148 80	5.122	256 [illegible]
Spencer,	202 00	68 74	270 74	36 24	42 94	1.601	68 74
Sterling,	755 99	134 18	890 17	97 18	103 53	1.296	64 [illegible]
Stockbridge,	-	3 53	3 53	29 42	6 43	.549	3 [illegible]
Stoneham,	600 50	176 24	776 74	87 77	111 40	1.582	79 [illegible]
Stoughton,	163 42	94 79	258 21	66 30	47 51	1.995	94 [illegible]
Sturbridge,	281 63	13 49	295 12	65 80	9 78	1.379	13 49
Sudbury,	641 04	460 55	1,101 59	50 30	90 06	5.114	255 [illegible]
Sunderland,	36 30	272 90	309 20	120 78	300 22	.909	45 45
Sutton,	429 65	174 09	603 74	73 27	76 32	2.281	114 [illegible]
Swampscott,	1,501 71	287 33	1,789 04	191 55	192 84	1.490	74 [illegible]
Swansea,	23 17	25 33	48 50	23 21	22 74	1.114	25 33
Taunton,	1,262 28	138 62	1,400 90	69 31	47 26	2.933	138 62
Templeton,	448 28	100 25	548 53	71 99	50 07	2.002	100 [illegible]
Tewksbury,	274 18	172 88	447 06	44 93	35 95	4.809	172 88
Tisbury,	1,264 50	143 00	1,407 65	70 59	74 09	1.931	96 55
Townsend,	955 58	323 68	1,279 26	55 86	69 15	4.681	234 [illegible]
Truro,	1,218 04	283 95	1,501 99	94 88	120 17	2.363	118 [illegible]
Tyngsborough,	1,265 75	132 67	1,398 42	56 32	45 10	2.942	132 67
Uxbridge,	580 94	83 61	664 55	56 85	38 42	2.176	83 61
Wales,	135 83	71 69	207 52	59 80	68 93	1.040	52 60
Walpole,	1,572 31	194 41	1,766 72	50 36	42 84	4.538	194 41
Ware,	628 66	75 81	704 47	60 78	33 22	2.282	75 81
Wareham,	581 23	506 42	1,087 65	69 54	199 77	2.535	126 [illegible]
Warren,	1,718 88	315 19	2,034 07	94 94	95 51	3.300	165 00
Watertown,	1,629 39	79 62	1,709 01	219 38	93 67	.850	42 50
Wayland,	643 10	317 47	960 57	71 52	123 00	2.581	129 05

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Table showing the Amounts expended for Repairs, etc. — Concluded.

TOWN OR CITY.	Expended to 1905.	Expended in 1905.	Total.	Total Cost per Mile per Year.	Expended per Mile in 1905.	Length under Maintenance (Miles).	Amount to be assessed on Cities or Towns.
Wellesley, . .	$42 50	$69 58	$112 08	$22 78	$59 17	1.176	$58 80
Wellfleet, . . .	457 18	429 00	886 18	162 90	101 39	4.231	211 55
Wenham, . . .	362 56	204 04	566 60	68 43	116 33	1.754	87 70
Westborough, . .	235 60	45 13	280 73	41 40	20 78	2.172	45 13
West Boylston, .	957 44	334 52	1,291 96	117 66	215 40	1.553	77 65
West Bridgewater, .	415 83	89 48	505 31	47 76	28 32	3.160	89 48
West Brookfield, .	275 53	126 69	402 22	48 81	76 46	1.657	82 85
Westfield, . .	4,286 14	1,622 28	5,908 42	151 11	279 46	5.805	290 25
Westford, . .	327 21	296 44	623 65	69 68	91 32	3.246	162 30
Westminster, . .	3,672 79	896 77	4,569 56	168 62	170 91	5.247	262 35
West Newbury, .	3,548 04	241 55	3,789 59	191 88	93 12	2.594	129 70
Weston, . . .	928 33	163 64	1,091 97	57 78	51 92	3.152	157 60
Westport, . .	4,988 92	282 71	5,271 63	141 87	66 46	4.254	212 70
West Springfield, .	1,117 16	67 84	1,185 00	113 39	58 84	1.153	57 65
West Tisbury, . .	1,081 68	246 19	1,327 87	48 40	46 03	5.348	246 19
Westwood, . .	351 31	66 71	418 02	74 65	63 71	1.047	52 35
Weymouth, . .	950 56	115 44	1,066 00	57 75	57 81	1.997	99 85
Whately, . . .	217 93	110 70	328 63	36 11	42 07	2.798	110 70
Whitman, . .	936 98	68 85	1,005 83	61 44	40 57	1.697	68 85
Wilbraham, . .	1,248 80	278 35	1,527 15	65 60	57 80	4.816	240 80
Williamsburg, . .	958 54	135 15	1,093 69	76 86	50 94	2.653	132 65
Williamstown, .	4,560 61	802 75	5,363 36	345 35	411 46	1.951	97 55
Winchester, . .	1,171 60	332 91	1,504 51	138 84	170 55	1.952	97 60
Windsor, . . .	247 91	72 59	320 50	81 01	73 47	.988	49 40
Woburn, . . .	560 57	295 50	856 07	112 35	145 35	2.033	101 65
Worcester, . .	5,553 20	177 32	5,730 52	285 67	39 94	4.440	177 32
Wrentham, . .	1,248 91	379 82	1,628 73	42 81	92 22	4.092	204 60
Yarmouth (north), .	2,025 95	296 12	2,322 07	67 78	79 69	3.716	185 80
Yarmouth (south), .	4,110 28	717 90	4,828 18	111 51	141 26	5.082	254 10
Totals, . .	$294,738 81	$57,455 90	$352,194 71	–	–	580.759	$24,994 84

The average cost per mile for maintenance during the year 1905 was $96.07, and the average cost since the beginning of the maintenance is $111.56.

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Appendix G.

Statement showing the Number of Petitions received and the Length of Way petitioned for, the Lay-outs made and their Length and Distribution in the Various Counties of the Commonwealth.

Counties.	Petitions received.				Petitions situated in —			Lay-outs made in —			Number of Lay-outs.
	County.	City.	Town.	Total.	Cities.	Towns.	Total.	Cities.	Towns.	Total.	
Barnstable,	-	-	40	40	-	15	15	-	14	14	80
Berkshire,	15	5	44	64	2	24	26	2	14	16	68
Bristol,	2	6	41	49	2	17	19	1	15	16	69
Dukes,	2	-	5	7	-	5	5	-	5	5	21
Essex,	2	18	49	69	7	25	32	7	16	23	78
Franklin,	1	-	51	52	-	16	16	-	13	13	67
Hampden,	4	3	25	32	3	17	20	1	11	12	63
Hampshire,	1	4	42	47	1	17	18	1	12	13	57
Middlesex,	12	17	82	111	7	42	49	4	27	31	122
Nantucket,	-	-	1	1	-	1	1	-	1	1	12
Norfolk,	2	3	42	47	1	24	25	1	19	20	71
Plymouth,	-	4	50	54	1	25	26	1	17	18	86
Suffolk,	-	1	6	7	1	2	3	1	1	2	6
Worcester,	-	7	121	128	2	55	57	2	40	42	187
Totals,	41	68	599	708	27	285	312	21	205	226	987

Number of Petitions received, etc. — *Concluded.*

Counties.	Lengths petitioned for.		Lengths Laid out.					
			1894-1904.		1905.		Total.	
	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Barnstable,	647,711	122.67	333,755	63.21	40,097	7.59	373,852	70.80
Berkshire,	633,335	119.95	189,854	35.96	18,382	3.52	208,436	39.48
Bristol,	762,360	144.37	226,839	42.98	21,002	3.98	247,941	46.96
Dukes,	121,043	22.93	64,724	12.07	5,975	1.13	69,699	13.20
Essex,	978,650	185.35	208,841	39.55	29,869	5.66	238,710	45.21
Franklin,	564,069	106.84	156,084	29.56	15,451	2.92	171,535	32.48
Hampden,	561,362	106.32	181,041	34.29	18,036	3.42	199,077	37.71
Hampshire,	496,368	94.01	137,540	26.05	12,113	2.29	149,653	28.34
Middlesex,	1,467,755	277.98	427,591	80.98	31,604	5.99	459,195	86.97
Nantucket,	34,185	6.47	34,211	6.48	-	-	34,211	6.48
Norfolk,	609,037	115.35	194,103	36.76	34,641	6.56	228,744	43.32
Plymouth,	888,790	168.33	307,958	58.33	27,236	5.16	335,194	63.49
Suffolk,	56,375	10.68	11,644	2.21	-	-	11,644	2.21
Worcester,	1,575,139	298.32	514,561	97.45	43,962	8.33	558,523	105.78
Totals,	9,396,109	1,779.57	2,987,846	565.88	298,568	56.55	3,286,414	622.43

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APPENDIX H.

SHOWING THE WORK DONE UNDER THE "SMALL TOWN" ACT SINCE ITS PASSAGE IN 1900.

[Section 17, chapter 47, Revised Laws.]

TOWNS.	ALLOTMENTS.[1]			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	
Barnstable County.							
Eastham,	$196 00	-	$196 00	1,150	-	1,150	Graded only.
Provincetown,	-	[2] $1,300 00	1,300 00	-	5,280	5,280	Macadam.
Wellfleet,	1,653 00	-	1,653 00	2,250	-	2,250	Broken stone and clay.
	$1,849 00	$1,300 00	$3,149 00	3,400	5,280	8,680	
Berkshire County.							
Alford,	$501 00	$176 00	$677 00	2,122	806	2,928	Gravel.
Egremont,	1,380 00	536 00	1,916 00	3,060	1,196	4,256	Gravel.
Florida,	1,216 00	432 00	1,648 00	2,500	600	3,100	Gravel.
Lanesborough,	1,474 00	-	1,474 00	4,614	-	4,614	Gravel.
Monterey,	968 00	344 00	1,312 00	7,000	2,620	9,620	Gravel.
Mount Washington,	513 00	254 00	767 00	-	1,000	1,000	Gravel road and bridge repairs.
New Ashford,	205 00	[3] 120 00	325 00	1,100	-	1,100	Gravel road and culvert repairs.

[1] In many instances the towns have contributed sums in addition to the allotments of the commission, thus making it possible to improve a greater length of road. The lengths shown as built represent the total length improved with all the money available. [2] Town contributed $2,600. [3] Work not yet begun.

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WORK DONE UNDER THE "SMALL TOWN" ACT — *Continued.*

TOWNS.	ALLOTMENTS.[1]			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	
Berkshire County — Concluded.							
New Marlborough,	$3,272 00	-	$3,272 00	12,600	-	12,600	Gravel.
Otis,	1,272 00	$496 00	1,768 00	4,000	2,200	6,200	Gravel road and culvert repairs.
Peru,	783 00	296 00	1,079 00	4,765	1,340	6,105	Gravel.
Sandisfield,	2,532 00	756 00	3,288 00	6,290	1,975	8,265	Macadam.
Savoy,	1,748 00	616 00	2,364 00	4,500	1,500	6,000	Gravel.
Sheffield,	2,024 00	1,064 00	3,088 00	4,500	[2] 2,632	7,132	Grading and gravel.
Tyringham,	906 00	368 00	1,274 00	1,700	1,190	2,890	Graded only.
Washington,	1,788 00	-	1,788 00	4,620	-	4,620	Grading and gravel.
West Stockbridge,	1,732 00	-	1,732 00	4,200	-	4,200	Gravel.
	$22,314 00	$5,458 00	$27,772 00	67,571	17,059	84,630	
Bristol County.							
Easton,	-	[3] $4,000 00	[4] $4,000 00	-	-	-	Macadam.
Norton,	$2,200 00	-	2,200 00	3,750	-	3,750	Macadam.
	$2,200 00	$4,000 00	$6,200 00	3,750	-	3,750	
Essex County.							
Danvers,	$3,000 00	-	$3,000 00	4,000	-	4,000	Gravel.
Georgetown,	800 00	$550 00	[4] 1,350 00	4,937	750	5,687	Gravel and macadam.
Middleton,	1,216 00	[5] 514 00	1,730 00	2,100	[6] 1,500	3,600	Gravel.

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Salisbury,	1,948 00	–	1,948 00	2,150	–	2,150	Macadam.
Topsfield,	2,484 00	–	2,484 00	7,625	–	7,625	Gravel.
Franklin County.	$9,448 00	$1,064 00	$10,512 00	20,812	2,250	23,062	
Bernardston,	$809 00	–	$809 00	3,700	[6] 2,100	5,800	Gravel.
Conway,	3,252 00	–	3,252 00	5,800	–	5,800	Gravel.
Gill,	862 00	$577 00	1,439 00	3,750	1,450	5,200	Gravel road and bridge repairs.
Hawley,	1,397 00	–	1,397 00	3,000	[6] 1,400	4,400	Grading and gravel.
Heath,	1,031 00	–	1,031 00	2,250	–	2,250	Gravel.
Leverett,	1,556 00	452 00	2,008 00	2,150	2,624	4,774	Gravel.
Leyden,	1,341 00	568 00	1,909 00	7,000	[3] 1,600	8,600	Gravel.
Monroe,	952 00	[5] 376 00	1,328 00	2,000	[6] 1,000	3,000	Gravel.
New Salem,	1,452 00	–	1,452 00	1,980	–	1,980	Gravel.
Rowe,	1,263 00	–	1,263 00	2,750	[6] 950	3,700	Gravel.
Shutesbury,	858 00	332 00	1,190 00	2,900	1,200	4,100	Gravel.
Warwick,	1,288 00	[5] 711 00	1,999 00	2,100	–	2,100	Gravel.
Wendell,	1,874 00	776 00	2,650 00	2,100	2,300	4,400	Grading and gravel.
Hampden County.	$17,935 00	$3,792 00	$21,727 00	41,480	14,624	56,104	
Blandford,	$3,444 00	–	$3,444 00	8,400	–	8,400	Grading and gravel.
East Longmeadow,	680 00	–	680 00	2,850	–	2,850	Gravel.
Granville,	2,800 00	[5] $623 00	3,423 00	5,237	[3,6] 760	5,997	Grading and gravel.
Hampden,	1,140 00	340 00	1,480 00	17,662	4,883	22,545	Gravel.

[1] See note on page 81.
[2] Work practically but not entirely completed.
[3] Work begun but not completed.
[4] The town appropriated an equal amount.
[5] Work not yet begun.
[6] Built with 1904 allotment.

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WORK DONE UNDER THE "SMALL TOWN" ACT — *Continued.*

TOWNS.	ALLOTMENTS.[1]			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	
Hampden County — Concluded.							
Longmeadow,	$1,200 00	–	$1,200 00	1,425	–	1,425	Macadam and 128 feet concrete culvert.
Montgomery,	600 00	$208 00	808 00	650	1,100	1,750	Gravel.
Southwick,	–	600 00	600 00	–	1,600	1,600	Gravel.
Tolland,	1,161 00	484 00	1,645 00	2,300	[2] 700	3,000	Grading and 40 feet concrete culvert.
	$11,025 00	$2,255 00	$13,280 00	38,524	9,043	47,567	
Hampshire County.							
Chesterfield,	$1,540 00	–	$1,540 00	1,750	–	1,750	Gravel.
Cummington,	1,484 00	$480 00	1,964 00	4,400	900	5,300	Gravel.
Enfield,	–	600 00	600 00	–	2,450	2,450	Gravel.
Greenwich,	480 00	–	480 00	–	[4] 700	700	Gravel.
Middlefield,	[5] 800 00	–	800 00	1,800	–	1,800	Gravel.
Pelham,	1,172 00	[6] 400 00	[7] 1,572 00	1,650	–	1,650	Gravel.
Plainfield,	960 00	[6] 340 00	1,300 00	1,883	–	1,883	Gravel.
Prescott,	994 00	372 00	1,366 00	1,530	800	2,330	Grading and gravel.
Westhampton,	1,159 00	452 00	1,611 00	2,840	2,538	5,378	Gravel.
Worthington,	2,008 00	730 00	2,738 00	3,600	1,400	5,000	Gravel.
	$10,592 00	$3,374 00	$13,966 00	19,453	8,788	28,241	

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Middlesex County.							
Ayer,	$1,000 00	$1,000 00	[6] $2,000 00	5,500	[7] 3,100	8,600	Gravel.
Billerica,	3,484 00	–	3,484 00	4,700	–	4,700	Macadam.
Carlisle,	456 00	–	456 00	–	–	–	–
Dunstable,	325 00	–	325 00	2,100	–	2,100	Gravel.
Hudson,	3,000 00	–	3,000 00	10,857	–	10,857	Graded only.
Maynard,	4,672 00	[9] 1,640 00	[6] 6,312 00	8,283	2,700	10,983	Grading, macadam and bridge repairs.
Sherborn,	1,758 00	894 00	2,652 00	7,500	[7] 2,100	9,600	Gravel.
Shirley,	1,994 00	–	1,994 00	3,800	[10] 3,150	6,950	Gravel.
Stow,	1,805 00	–	1,805 00	4,900	–	4,900	Gravel.
Westford,	2,366 30	–	2,366 30	5,400	–	5,400	Gravel.
	$20,860 30	$3,534 00	$24,394 30	53,040	11,050	64,090	
Norfolk County.							
Avon,	$1,346 00	$407 00	$1,753 00	5,280	1,350	6,630	Gravel and macadam.
Bellingham,	1,412 00	–	1,412 00	2,750	–	2,750	Macadam.
Medway,	980 00	[11] 1,000 00	[8] 1,980 00	2,800	–	2,800	Macadam.
Millis,	1,008 00	–	1,008 00	2,700	–	2,700	Gravel.
	$4,746 00	$1,407 00	$6,153 00	13,530	1,350	14,880	
Plymouth County.							
Carver,	$3,784 00	$1,448 00	[8] $5,232 00	11,985	4,800	16,785	Macadam.
East Bridgewater,	3,100 00	[5] 342 87	[8] 3,442 87	9,350	–	9,350	Gravel and macadam.

[1] See note on page 81.
[2] Work practically but not entirely completed.
[3] To complete work under 1904 contract.
[4] Built with 1903 and 1904 allotments.
[5] Includes $400 not yet contracted for.
[6] Work not yet begun.
[7] Includes $400 allotted in 1903 not yet contracted for.
[8] The town appropriated an equal amount.
[9] This is the maximum amount to be paid under the contract. The allotment will vary from $1,500 to $1,640, according to the final estimate.
[10] Built with 1904 allotment.
[11] Work begun but not completed.

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WORK DONE UNDER THE "SMALL TOWN" ACT — *Concluded.*

TOWNS.	ALLOTMENTS.[1]			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	
Plymouth County — Concluded.							
Halifax,	$1,016 00	$344 00	$1,360 00	2,460	1,290	3,750	Macadam.
Hanover,	[2] 2,368 00	–	[2] 2,368 00	–	2,827	2,827	Macadam.
Hanson,	3,400 00	[4] 1,086 00	4,486 00	8,304	–	8,304	Macadam.
Lakeville,	700 00	–	700 00	2,640	–	2,640	Macadam.
Norwell,	1,000 00	1,080 00	[5] 2,080 00	5,280	[5] 3,700	8,980	Gravel.
Pembroke,	2,848 00	–	2,848 00	20,471	–	20,471	Gravel.
Plympton,	1,070 00	360 00	1,430 00	6,848	[5] 3,030	9,878	Gravel.
Rochester,	4,500 00	–	4,500 00	19,027	–	19,027	Macadam.
	$23,786 00	$4,660 87	$28,446 87	86,365	15,647	102,012	
Worcester County.							
Ashburnham,	$2,044 00	–	$2,044 00	3,160	–	3,160	Gravel.
Berlin,	1,880 00	$544 00	2,424 00	4,425	2,600	7,025	Gravel.
Bolton,	1,594 00	544 00	2,138 00	6,925	3,000	9,925	Gravel.
Boylston,	520 00	520 00	1,040 00	2,100	–	2,100	Gravel.
Dana,	769 00	–	769 00	2,000	–	2,000	Gravel.
Hubbardston,	1,440 00	840 00	2,280 00	1,700	3,950	5,650	Gravel.

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Mendon,	1,916 00	548 00	2,464 00	7,300	[6]5,625	12,925	Gravel.
Oakham,	1,352 00	-	1,352 00	4,780	-	4,780	Gravel.
Petersham,	2,940 00	1,020 00	3,960 00	3,825	2,310	6,135	Gravel.
Rutland,	1,804 00	-	1,804 00	2,581	-	2,581	Gravel and macadam.
Winchendon,	4,000 00	-	4,000 00	9,210	-	9,210	Gravel.
	$20,259 00	$4,016 00	$24,275 00	48,906	17,485	66,391	

[1] See note on page 81.
[2] Includes $319.18 not yet contracted for.
[3] The town appropriated an equal amount.
[4] Work begun but not completed.
[5] Work practically but not entirely completed.
[6] Includes 3,125 feet built with 1904 allotment.

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SUMMARY.

COUNTIES.	ALLOTMENTS.			LENGTHS BUILT (FEET).		
	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.	Previous to 1905.	In 1905.	Total to Dec. 31, 1905.
Barnstable,	$1,849 00	$1,300 00	$3,149 00	3,400	5,280	8,680
Berkshire,	22,314 00	5,458 00	27,772 00	67,571	17,059	84,630
Bristol,	2,200 00	4,000 00	6,200 00	3,750	-	3,750
Essex,	9,448 00	1,064 00	10,512 00	20,812	2,250	23,062
Franklin,	17,935 00	3,792 00	21,727 00	41,480	14,624	54,004
Hampden,	11,025 00	2,255 00	13,280 00	38,524	9,043	47,567
Hampshire,	10,592 00	3,374 00	15,966 00	19,453	8,788	28,241
Middlesex,	20,860 30	3,534 00	24,394 30	53,040	11,050	64,090
Norfolk,	4,746 00	1,407 00	6,153 00	13,530	1,350	14,880
Plymouth,	23,786 00	4,660 87	28,446 87	86,365	15,647	102,012
Worcester,	20,259 00	4,016 00	24,275 00	48,906	17,485	66,391
Totals,	$145,014 30	$34,860 87	$179,875 17	196,831	102,576	499,407

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Appendix I.

Report of Forester.

Clinton, Mass., Dec. 7, 1905.

To the Massachusetts Highway Commission.

Gentlemen: — The work of tree planting during this past year has been pursued in a similar manner to that of last year. The contract for 4,000 trees, given out in the spring, was awarded to Ellwanger & Barry of Rochester, N. Y., whose honorable dealings last year and low figures the present year entitled them to it.

The almost unprecedented drought during the fall of 1904 and the spring of the present year had a very marked effect on the trees that were planted at that time. The total loss of trees planted previous to the present fall has been 15 per cent., and this loss is traceable in a very large degree to the dry weather referred to, as trees planted under varying conditions and over such an area cannot receive the attention they could under more favorable circumstances. While it is impossible to determine with any degree of accuracy, it is safe to estimate the loss occasioned as the result of mischievous boys' work, careless drivers and stray cattle, at 25 per cent of the number lost.

In order to carry out the tree planting with the greatest economy, the work done this year has been in localities where it is a continuation of, or in proximity to, the work of last year, so that the inspection of one and the laying out of the other could be done on the same trip.

During the spring but one lot was planted, viz., the Dennis and Brewster road; the remainder, as per the accompanying table, were planted during the fall. In Lenox, in the cut on Mattoon Hill, pockets of soil were made in the ledge, and vines were planted in them to help cover the rocks.

Considerable time has been devoted to the care of the trees planted during 1904, made necessary by the dry weather and insect pests. Among those planted during the spring of 1904 I wish to call your attention to the elms at Dennis and the maples at Leicester and Spencer, as their growth has been wonderful for the time they have been planted.

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In the so-called infected district the brown-tail moths were in evidence, but in other parts of the State very few have been found, and they have been speedily removed, as also the wild cherry trees, which proved to be nothing but a breeding place for caterpillars of various kinds. The fall web worm defoliated a portion of the trees at the Cape during the summer, but they soon made new leaves, and by fall they were in good shape. It will be necessary to spray these trees in the future, to prevent a recurrence.

The introduction of town water in our nursery at South Lancaster the past summer will be a great benefit, and will in the future make a vast difference both in the growing and shipping facilities. To provide for the future needs of the trees, additional land was plowed at the nursery in the spring, and clover sown; stable dressing was applied and all plowed in this fall. The ground used the past two years has been enriched and plowed with the intent of growing clover next year as additional enrichment, after which the ground can again be used.

The unusual weather during the fall has enabled us to carry out every plan. Our work for the year has been as follows:—

Trees replaced,	726
New plantings,	3,239
Vines planted,	300

We have on hand now in the nursery 689 trees.

EDWARD W. BREED.

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SHOWING THE VARIETIES AND DISTRIBUTION OF SHADE TREES PLANTED IN 1905.

New Planting.

CITY OR TOWN.	Sugar Maple.	Norway Maple.	White Maple.	Elm.	Laurel-leafed Willow.	Golden Willow.	Salamoni Willow.	Pin Oak.	White Poplar.	Carolina Poplar.	Lombardy Poplar.	Green Ash.	Norway Spruce.	Totals.
Ashby,	-	-	-	-	-	-	-	-	-	-	-	-	25	25
Athol,	-	-	-	115	-	2	-	-	-	14	6	-	-	137
Auburn,	122	34	100	38	19	11	-	-	14	53	11	-	-	402
Brewster,	-	90	-	263	-	34	29	19	22	-	-	100	-	557
Brookfield,	60	96	142	-	1	7	-	-	-	-	2	-	-	308
Chatham,	-	-	-	20	-	-	-	-	-	-	-	-	-	20
Dennis,	-	47	-	71	-	21	-	-	-	-	-	-	-	139
Gardner,	3	30	104	15	9	15	18	-	50	61	2	-	-	307
Lenox,	11	60	15	21	-	13	-	-	-	2	-	-	-	122
Norfolk,	-	-	-	18	37	-	19	-	-	29	6	-	-	109
Pittsfield,	3	4	-	26	-	20	-	-	-	-	-	-	-	53
Princeton,	-	68	-	21	-	7	-	-	-	-	-	-	-	96
Richmond,	93	123	43	10	-	25	-	-	-	-	-	-	-	294
Templeton,	18	55	11	8	3	-	-	-	-	-	-	-	-	95
Walpole,	-	-	-	20	-	1	-	-	-	11	21	-	-	53
Westfield,	78	-	153	154	-	-	-	-	2	-	-	-	-	387
Wrentham,	31	-	-	16	-	23	-	-	-	20	45	-	-	135
Totals,	419	607	568	816	69	179	66	19	88	190	93	100	25	3,239

On hand: sugar maple, 50; white maple, 153; elm, 33; golden willow, 164; salamoni willow, 6; pin oak, 205; white poplar, 18; Carolina poplar, 7; black locust, 50; total, 689.

Lenox: vines, woodbines, 100; evergreen gem roses, 50; clematis, 50; bittersweet, 50; frost grape, 50; total, 300.

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SHOWING THE VARIETIES AND DISTRIBUTION OF SHADE TREES PLANTED IN 1905 — *Concluded.*

Replaced.

CITY OR TOWN.	Sugar Maple.	Norway Maple.	White Maple.	Elm.	Laurel-leaved Willow.	Golden Willow.	Salmonet Willow.	Pin Oak.	White Poplar.	Carolina Poplar.	Lombardy Poplar.	Green Ash.	Norway Spruce.	Total.
Andover,	19	—	10	3	—	—	—	—	—	11	6	—	—	49
Ashby,	27	24	7	1	—	—	—	14	34	—	—	—	—	107
Brewster,	—	25	—	27	—	—	—	—	—	—	—	—	—	52
Dennis,	—	—	—	39	—	—	—	—	—	—	—	—	—	39
Fitchburg (Ashby Road),	26	7	—	—	5	2	—	—	—	—	—	—	—	40
Fitchburg (Westminster Road),	1	—	3	2	—	—	—	2	9	—	—	—	—	17
Leicester,	—	8	—	—	—	—	—	1	—	—	—	—	—	9
Lenox,	—	—	—	—	—	6	—	—	8	—	—	—	—	14
Natick,	4	—	1	1	—	—	—	—	2	3	—	—	—	11
North Reading,	20	5	—	8	—	—	—	—	21	2	—	—	—	56
Norwood,	5	9	—	4	—	—	—	10	—	1	—	—	—	29
Reading,	54	2	—	14	—	2	—	—	15	—	—	—	—	87
Spencer,	3	—	—	—	—	—	—	6	—	—	—	—	—	9
Stoneham,	17	—	—	32	—	1	—	—	—	—	—	—	—	50
Townsend,	34	—	3	10	—	—	—	2	—	25	1	—	—	75
Walpole,	—	6	—	5	—	—	—	—	6	—	—	—	—	17
Wellesley,	2	—	—	—	—	—	—	—	—	—	1	—	—	3
Westminster,	27	6	8	10	1	2	—	6	—	—	—	—	—	60
Westwood,	—	—	—	2	—	—	—	—	—	—	—	—	—	2
Totals,	239	92	32	158	6	13	—	41	95	42	8	—	—	726

NOTE.—Elms were used to replace maples in some instances, and white and Carolina poplars to replace oaks.

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Appendix J.

Appropriations.

Appropriations for the Construction and Repair of State Highways.

1894, chapter 497, section 8,	$300,000 00
1895, chapter 347, section 3,	400,000 00
1896, chapter 481, section 3,	600,000 00
1897, chapter 340, section 1,	800,000 00
1898, chapter 539, section 1,	400,000 00
1899, chapter 396, section 1,	500,000 00
1900, chapter 442, section 1,	500,000 00
1901, chapter 269, section 1,	500,000 00
1902, chapter 246, section 1,	500,000 00
1903, chapter 280, section 1,	[1] 2,250,000 00
Total,	$6,750,000 00

Appropriations for the Salaries and Expenses of the Commission, paid from the Treasury of the Commonwealth.

1898, chapter 497, section 1,	$14,300 00
1899, chapter 367, section 1,	28,500 00
1900, chapter 141, section 1,	28,500 00
1901, chapter 451, section 1,	33,750 00
1902, chapter 67, section 1,	33,750 00
1903, chapters 14 and 485, section 1,	[2] 43,950 00
1904, chapters 19 and 461, section 1,	[2] 39,300 00
1905, chapters 36, 431 and 480, section 1,	[2] 46,150 00

Appropriations for Maintenance, paid from the Treasury of the Commonwealth.

1903, chapter 280, section 2,	$40,000 00
1904, chapter 316, section 1,	50,000 00
1905, chapter 36, section 1,	60,000 00

[1] To cover expenses of construction for a period of five years.
[2] Includes expenses of automobile department.

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INDEX.

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INDEX.

A.

	PAGE
Appropriation for maintenance recommended,	11
Appropriation for salaries and expenses, 1898-1905, inclusive,	93
Appropriations for State highway construction,	5, 93
Appropriations for maintenance,	93
Assessments, county,	7
Assessments, maintenance, on cities and towns,	73
Automobile registration,	16, 20
Automobiles, discussion of existing laws relating to,	18

B.

Bridges and culverts,	7

C.

Claims, statement of,	70
Clerical force,	19
Completed road, miles of,	5
Concrete culverts and bridges,	7
Construction, discussion of methods, etc.,	8
Construction, table of details of work done, etc.,	38
Contracts, number of, in 1905,	6
Contract prices, table of,	64
Contractors, list of, taking contracts in 1905,	64
Cost of State highways,	71
County assessments,	7
Culverts and bridges, discussion of,	7

D.

Damages, statement of claims for,	70

E.

Engineering work, office,	14
Engineers employed,	19
Engineers, resident, work on which employed during 1905,	60
Expenditures for construction,	21
Expenditures for maintenance,	28
Expenditures for repairs to road machinery,	35
Expenditures for salaries and expenses,	35
Expenditures, summary of,	36
Expenditures under "small town" act,	33
Expenditures on account of automobile department,	35
Expenditures on account of Lynn road,	34
Expenditures on account of special work at Middlefield,	34

Digitized by Google

F.

PAGE
Forester's report, ... 89

G.

Gypsy and brown-tail moths, ... 11, 16

H.

Hearings, county, discontinuance of, recommended, ... 5

I.

Insect pests, ... 11, 16

L.

Lay-outs made in 1905, ... 5
Lay-outs made, summary of, ... 38, 80
Length of State highway completed, ... 5, 38
Length of roads built under "small town" act, ... 5, 81
Legislation, new, recommended, ... 5, 18
Location of State highways, ... 38
Lynn road, ... 13

M.

Maintenance, appropriation for, recommended, ... 11
Maintenance, amounts to be assessed on towns and cities, ... 73
Maintenance contracts, ... 9
Maintenance, cost of, ... 9, 73
Maintenance, discussion of cost of, etc., ... 9
Maintenance, expenditures for, ... 28
Meetings of commission, ... 5
Municipalities in which work has been done during 1905, ... 60

O.

Office engineering work, ... 14
Office expenses, ... 35

P.

Petitions, ... 6, 80
Petitions received during 1905, ... 6
Petitions, distribution of, and lengths of road petitioned for, ... 80
Prices, contract, in 1905, table of, ... 64

R.

Registration of automobiles, ... 16, 20
Repairs and maintenance (*see* Maintenance).
Resident engineers employed during 1905, list of, ... 60
Resurfaced roads, ... 9, 10
Road machinery, discussion of use of, ... 13
Road rollers, work done by, ... 13
Roads resurfaced, ... 9, 10

Digitized by Google

S.

PAGE
"Small town" work, ... 5, 11, 81
Steam road rollers, ... 13
Street railways, ... 6
Stone crushers, ... 13
Surfacing material, ... 38
Surveys, ... 14

T.

Tree planting, ... 15, 89
Trees, shade, ... 15
Trees, varieties and distribution of trees planted in 1905, ... 91, 92

W.

Widths of State highways, ... 38

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BOLTON POND, LOOKING NORTH.

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PUBLIC DOCUMENT . . . . . No. 65.

SIXTH ANNUAL REPORT

OF THE

WACHUSETT MOUNTAIN

STATE RESERVATION COMMISSION.

JANUARY, 1906.

BOSTON:
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Approved by

The State Board of Publication.

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OFFICERS.

Commissioners.

HAROLD PARKER. THEO. L. HARLOW.
JOHN T. BURNETT.

Superintendent.

GUY H. CHASE.
Address, Princeton, Mass.

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Commonwealth of Massachusetts.

REPORT OF THE WACHUSETT MOUNTAIN STATE RESERVATION COMMISSION.

In the fifth annual report of the commission it was strongly urged that an appropriation of $25,000 be made to enable it to construct fire guards, acquire adjoining lands and to reconstruct the building at the summit of the mountain. Owing to the fact that no such appropriation was made by the Legislature last year, your commissioners have no report to render for such work as was therein recommended, except such as they have been able to do out of the appropriation made by the county of Worcester. It was pointed out in that report that fire guards for the protection of the State property were, in the opinion of the commissioners, absolutely necessary; so necessary, in fact, that with the money allowed by the county of Worcester, which is hardly more than sufficient to maintain the reservation in fair condition, a certain amount had to be spent in the construction, so far as it would go, of the fire guards that we had urged upon the Legislature. In view of the fact that it was not deemed wise on the part of the State to make appropriations for this purpose, the commissioners have decided to make no further request for help in this respect from the State, but to go on with the construction of this necessary protection out of the county appropriation as fast as it is possible, notwithstanding that the commissioners believe that serious loss may result because of uncontrollable fires within the limits of the reservation.

The report of the superintendent shows in detail the work as it has been done, and the measures that have been taken to

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protect, so far as it is possible, the territory acquired by the Commonwealth on Mount Wachusett.

Reference is made to the report of the consulting forester as to certain methods of developing the forest growth on the mountain, with a view to improving the growth thereon, as a matter of financial economy and also as a matter of picturesque beauty. These reports are submitted herewith, as indicating the needs in the case and embodying also the views of the commissioners themselves.

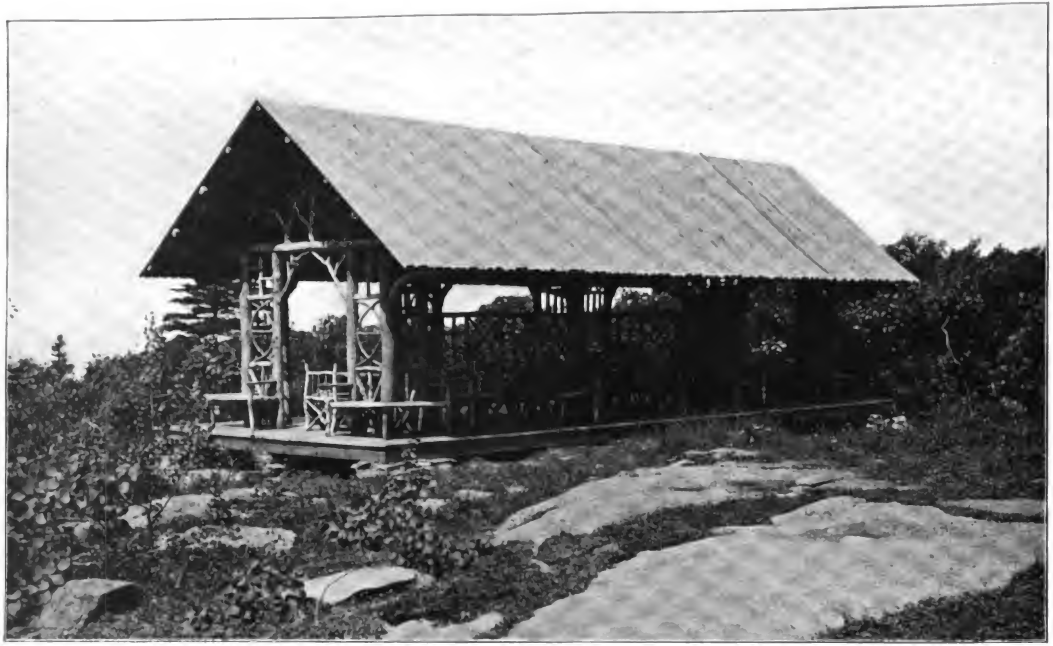
The reservation is yearly becoming more popular, and more people not only from the immediate country but from greater distances are collecting here each year as a centre for recreation and pleasure; it is estimated that nearly 50,000 people visited the reservation during the past year. It must be manifest that where so many people congregate, proper accommodations should be provided for their use. As has been repeatedly stated to the Legislature in former reports, the hotel and its surroundings are wholly inadequate, and are a cause of very much adverse criticism by the people who visit this region. It is claimed by these persons that, the reservation having been made for the public good, proper means of enjoying themselves should be supplied by either the State or the county.

By the advice of the Attorney-General, and also from the opinion of the county attorney, it is impossible for the commission to spend the appropriation made by the county for any material improvement or reconstruction of the State's buildings. The law provides that the county of Worcester shall maintain the reservation, and no more. The county money, therefore, cannot be used except to a very small degree in improving the conditions on the mountain.

The commissioners ask that a sum of not less than $12,000 be appropriated by the Legislature for the purpose of reconstructing the hotel on the summit, as being, in their opinion, no less than the circumstances actually demand.

The commissioners also believe and have so stated previously that certain tracts of land should be acquired, for the filling out of the proper outlines of the reservation. For this they ask a sum of not less than $5,000.

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RUSTIC LUNCH SHELTER, NEAR THE TOP OF WACHUSETT.

UNIV. OF MICH.

So far as the condition on the State reservation is concerned, it may be stated that the commissioners have used their best efforts in preserving the natural beauties; in maintaining the only road to the summit in a satisfactory condition; in building various shelters for the use of the public at different points within the reservation which command especially fine outlooks; in doing such things as they could towards the improvement of the forest conditions; in constructing roads as fire guards, as above referred to; and in further increasing, by breeding and otherwise, the number of deer and elk contained within the limits of the reservation. The cost of maintaining these animals is very small, owing to the fact that the natural increase requires no outside purchase, and all the feed is raised upon the reservation. The commissioners have felt that the breeding of deer and elk under conditions very near to their natural ones is an interesting experiment; they have made a careful study of this, and believe that the result may be of general usefulness.

There appears to be no doubt that this reservation will serve, as was intended, a very large public need, and it is very manifest that the public appreciates what the State has furnished. It seems, therefore, unwise on the part of the Commonwealth not to enable its commissioners to complete what it plainly had in view when the reservation was originally established. The commissioners therefore recommend the passage of the following act: —

AN ACT TO PROVIDE FOR THE IMPROVEMENT AND ENLARGEMENT OF THE WACHUSETT MOUNTAIN STATE RESERVATION.

Be it enacted, etc., as follows:

SECTION 1. A sum not exceeding seventeen thousand dollars shall be allowed and paid out of the treasury of the Commonwealth, from the ordinary revenue, to be expended by the Wachusett Mountain state reservation commission for the following purposes: for acquiring, by purchase or otherwise, such lands adjoining the present Wachusett Mountain state reservation as said commission may deem it necessary or advisable to acquire, a sum not exceeding five thousand dollars; for the reconstruction of the Summit house and adjacent buildings on Wachusett Mountain in said reservation, a sum not exceeding twelve thousand dollars.

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SECTION 2. Said commission shall have the same powe acquire, take and care for such additional lands as are given by section four of chapter three hundred and seventy-eig the acts of the year eighteen hundred and ninety-nine, and tion two of chapter four hundred and ninety-six of the a the year nineteen hundred and one, in respect to the lands a acquired by the commission for said reservation. The addi lands taken or acquired under the provisions of this act sh form a part of said reservation, and the title thereto shall be remain in the Commonwealth.

SECTION 3. This act shall take effect upon its passage.

Respectfully submitted,

HAROLD PARKER,
THEO. L. HARLOW,
JOHN T. BURNETT,
Commissioners.

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REPORT ON A PRELIMINARY EXAMINATION OF THE WACHUSETT MOUNTAIN STATE RESERVATION.

By R. T. Fisher, *Consulting Forester.*

To the Wachusett Mountain State Reservation Commission.

Dear Sirs: — I submit herewith my report upon an examination of the Wachusett Mountain forest, undertaken at the request of Mr. Harold Parker, for the purpose of determining the most satisfactory scheme for the regulation and development of the forest growth within the reservation. My understanding of the function of this tract, which I have discussed with Mr. Parker and Superintendent Chase, is that it is primarily a State park, for the resort and recreation of the people, and that it therefore should preserve and render accessible the woods, streams, points of outlook and other natural features of the mountain; but that, on the other hand, so long as this general policy is not interfered with, there is no reason why the wood and timber should not be utilized and developed in order in some degree to cut down the expenses of the reservation, or to increase the value and productiveness of the land. It is the fact that the present general needs of the Wachusett forest, from the park point of view, would be very largely fulfilled by a policy of utilization and development for the forest growth; but, on the other hand, improvements such as the extension of roads, trails and fire guards, which will render the tract safer and more accessible as a park, are needed to make the proper and profitable treatment of the woods fully practicable. It is assumed, therefore, in the general scheme herein discussed, that the carrying out of the park idea and the betterment of the forest go together.

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Forest Conditions.

The forest contained in the Wachusett reservation is mainly in poor condition. The great bulk of it consists of sprout hard woods, chiefly red, black and white oak, hickory, beech, chestnut, white ash, sugar and red maple. Most of it has been cut clear several times already, and the present stand, in blocks of various ages from ten to fifty years, is much reduced in value and vitality. Inferior species, such as gray birch, bird cherry and red maple, have in many places begun to crowd out the better trees, and the general rate of growth has been lowered through the frequent coppicing. In the higher parts of the reservation considerable damage was done to the larger growth by the ice storm of 1900. Much of the forest, however, particularly in the southern and southwestern portions, on the Gregory and Russell takings and along the Harrington trail, shows a thrifty young growth either of white pine or valuable hard woods, which, if released in time, will take the place of the older or worthless trees.

In addition to the main hard wood stand, there are scattered bodies of hemlock, occurring on the steep ledges south and west of the mountain and in the ravine above the deer park. The trees are old and of slow growth, but thrifty and reproducing well. White pine occurs in small groups on the west slope, and as a rapidly increasing young growth in and about the Woodward lot and along the lower and westerly edges of the forest generally. Taking the forest as a whole, whether as a park or a wood crop, it stands in need of proper cuttings to improve the growth, restore the lead to the valuable species, and encourage reproduction in the older, less healthy portions of the woods. Such cuttings would in no way spoil the characteristic appearance of the Wachusett forest, but rather tend to prevent its degenerating into forest weeds and poor growth.

Available Yield.

The present available yield consists almost entirely of cord wood. Small amounts of pine and hemlock saw timber could here and there be got out, but they are mostly too valuable

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SOUTH ROAD. ONE OF THE ROADS BUILT BY THE COMMISSION ON A FLAT GRADE

for purposes other than lumber to be considered for cutting, except for local use in very small quantities. The hard wood areas, according to the treatment proposed, will yield from 3 to 10 cords per acre at the first thinning or improvement cutting. This applies to stands twenty years old and over.

Fire Risk.

The situation of the Wachusett forest, concentrated upon the exposed slopes of a single mountain, makes the spread of a forest fire unusually easy. Furthermore, there is so much brush and small growth in the woods, which in occasional spring or autumn droughts get very dry, that a very destructive fire might easily occur. At present there are no adequate checks or fire guards to assist Mr. Chase and his men in restricting and fighting a possible fire.

General Outline of Management recommended.

In view of the facts that the Wachusett Mountain forest is in poor and unproductive condition and considerably exposed to damage from fire, and that its best usefulness as a park would be fulfilled by a policy of protection and gradual improvement and regeneration for the woods, the following scheme of management is recommended: —

1. Protection.

(*a*) A system of roads, trails and fire lines, so laid out as to make all parts of the tract accessible, and so adapted to the topography as to obstruct the natural progress of fires, and offer bases for back-firing in case of need.

(*b*) At least two resident watchers or patrolmen to watch the tract during the dangerous seasons of spring and fall, report the start of fires promptly to the superintendent, and go at once with all available help to the spot.

For the purposes of protection, as well as of travel, the roads, etc., already built, proposed and under construction by Mr. Chase are thoroughly serviceable, but they should be completed and extended along the lines indicated as fast as possible.

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2. *Transportation.*

Driveways or wood roads sufficient to make it possible to get out wood from the portions of the mountain most in need of cutting. This applies especially to the lower south and westerly slopes.

For this purpose also Mr. Chase's proposed locations are thoroughly suitable.

3. *Cuttings.*

(*a*) Thinnings and improvement cuttings in young and irregular stands, to improve the conditions of growth and remove the worthless in favor of the valuable species. Such cuttings to be made only where the stand is dense, and old enough to yield a return at least equal to the cost of the work.

(*b*) Reproduction cuttings in the older or damaged portions of the forest, to start young growth or release what is already on the ground. These cuttings to be made gradually over small areas, where the stand is accessible and the yield sufficient to cover the cost. Under this treatment, small amounts of saw timber can here and there be cut.

(*c*) No cutting should be made on the ledges and precipitous portions of the mountain, where the growth is slow and the danger of drying out the scanty soil is great.

4. *Planting.*

The open and unused land along the northern and eastern margins of the reservation should be gradually restocked with suitable species, particularly white pine. Some planting could also be done in the sparser portions of the forest, where natural reproduction is poor.

These measures Mr. Chase has already planned and provided for with a good forest nursery.

Practicability of Proposals.

The operations outlined above cover what seems to be a complete and sufficient management for the forest land of a public reservation like Wachusett. Inasmuch as they depend upon more roads and more labor, they require some *outlay*.

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The need of roads and trails, and at times more patrol, is quite as essential to the perpetuation and usefulness of the park, as such, as to the woods operations alone; therefore, only a portion of the cost of these measures is chargeable to the account of forestry, and their total cost can be more reliably had in Mr. Chase's estimates than in any that could here be given. As for the treatment of the woods, though it cannot be completely carried out under the present resources of the reservation, it can be satisfactorily begun. The proposed cuttings should yield a more or less constant profit, and they certainly are advisable if they pay no more than their own cost. Cord wood can be cut and shipped to one of the local brick yards or wood yards for (in round figures) from $3.50 to $4.50 a cord. The chopping will cost from $1 to $1.25, according to whether the thinnings will yield enough to be cut by the cord or by the day. Hauling to Princeton or Westminster should cost not over $1.35; loading, 25 cents; and shipping, $1.60 to $1, according to whether shipment is to Boston or nearer points. Marking the trees for cutting will cost from 5 to 10 cents a cord. This makes a maximum cost of $4.55, and a minimum of $3.65. On this basis, the prevailing price of $5 a cord for wood will leave a margin of from $1.35 to 45 cents as the returns from thinnings and improvement cuttings. If some of this should have to be used for the disposal of tops or swamping out temporary roads, the cutting would still be good policy for the reservation.

As regards the planting, that cannot of course pay for itself from the start, but it is none the less a good investment. Planting should cost at the outside $8 per acre, and should average nearer $6. An acre of white pine at fifty years old will yield from 30,000 to 40,000 board feet, according to soil, or, at a $5 stumpage rate, $150 to $200. At 4 per cent., the original outlay, with expenses of protection and incidentals, will have accumulated in that time to about $75, leaving $75 to $125 profit. Whether the timber be sold or left standing, the increase in the value of the land is plain.

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Execution of the Work.

In view of present conditions, the execution of the general scheme recommended had best be undertaken gradually, the roads and fire lines extended as the resources of the reservation permit, and the forest improvements carried out wherever the need is greatest and the opportunity for paying work is best. If this plan is approved by the commission, I stand ready, as a part of the service covered by this report, to cooperate with Mr. Chase in looking up a market, in locating the first cuttings, and in marking a sample area of forest for improvement. It is essential to the success of these cuttings that they be intelligently laid out and frequently inspected, and that the care of young growth be rigidly required of the choppers. It would be desirable, though not at present imperative, to have a detailed working plan for the whole tract, giving a description and an estimate of the stand; a division into compartments, with the exact condition and required treatment recorded for each; a set of cutting rules and a forest map. At present this would be too costly to be justifiable; but, in default of a working plan, it is all the more urgent that a trustworthy man be trained to carry on the marking for cutting, tally and inspect the wood and oversee the chopping. Any honest and experienced chopper can do this, under proper direction; or it may be possible, if Mr. Chase has the right help available, to distribute this work.

I shall be glad to discuss the matters of execution and supervision when the commission has considered this report.

Very truly yours,

RICHARD T. FISHER.

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SIXTH ANNUAL REPORT OF THE SUPERINTENDENT.

To the Wachusett Mountain State Reservation Commission.

GENTLEMEN: — For administration purposes, to properly protect the reservation from fire, for the benefit of visitors to the reservation, and to carry out the recommendations of the consulting forester, it is of primary importance to construct a system of road fire guards, as stated in my last annual report to your Board, and our efforts have been largely along those lines during the past year. We have constructed what is called the South Road, across the southerly end of the reservation, a distance of 4,750 feet, with all the necessary culverts, rock ballast, etc., with a maximum grade for a very short distance of 18 per cent. and an average grade of 5 per cent. This road is practically completed, requiring but a little surfacing in the coming spring. It is already used as a driving road for business and pleasure, and meets with a large measure of approval from the public, as well as being indispensable for administration of the reservation. It is altogether a well-built road, though it is in no sense a parkway.

We have also constructed across the north end of the reservation a road termed the North Road, extending from the Ox-bow on the Mountain Road to a point on the west town road in the town of Westminster, a distance of 5,400 feet, with all the necessary culverts and water courses, with a maximum grade of 14½ per cent. and an average grade of 5½ per cent. This road is not completed, as there is some unfinished ledge work; but it is passable for teams of any description, and in the early spring will be completed and open to the public. This road provides a new route to the

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summit for persons coming from Gardner, Westminster, Hubbardston or any points north or west of the reservation, thus saving much in distance, and, what is of more importance, eliminating the necessity of descending to the level of Wachusett Lake, and then making the long ascent from the lake to the summit of the mountain. The entrance to the reservation from the Westminster town road being 400 feet higher than the level of the town road at Wachusett Lake makes it unnecessary to descend to the lake and then climb 400 feet to reach a point on the Mountain Road the same elevation as the entrance to the reservation of the North Road.

We have cleared of all timber, wood and brush the location of what is to be termed the Administration Road, ready for construction in the spring. This road starts at a point about midway of the South Road, and runs through practically the centre of the reservation to a point about midway of the North Road, a distance of 8,400 feet, and is the important link in the system of roads to be constructed.

These three roads are a start in the right direction, and form a part of a system of roads to be built in the future as the appropriations will allow, not by any means a set of detached roads.

Considering the topography of the reservation, the grades are all comparatively easy, and the construction equals that of the average town road. While these roads are given over for the use and pleasure of the public, it must be remembered that the primary object is administrative. The important work on the reservation is in the line of forestry, and the roads are essential before a proper start may be made.

Since the date of our last report the nursery for raising seedlings for the purpose of reforesting the waste lands, and for underplanting where the growth is past its prime, has been enlarged until the capacity is three times greater than it was at that time. We now have over 2,000 lineal feet of seed beds, 4 feet wide, provided with movable screens, and have some two-year-old stock of white pine and white spruce. All the other seedlings came from the seed in May of this year. We have in the nursery the following stock: —

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Broadleaf.

Tulip tree,	*Liriodendron tulipifera.*
Catalpa,	*Catalpa bignonioides.*
Chestnut oak,	*Quercus prinus.*
Scarlet oak,	*Quercus coccinea.*

Conifers.

Larch,	*Larix laricina.*
White pine,	*Pinus strobus.*
White spruce,	*Picea Canadensis.*
Red spruce,	*Picea rubens.*
Norway spruce,	*Picea excelsa.*
Blue spruce,	*Picea pungens.*
Balsam fir,	*Abies balsamea.*

I would suggest that we reforest the summit of the mountain with spruce, — a tree well adapted to withstand snow and ice pressure. The present growth of beech is a low-lying, scrubby tree, that will never attain any great size; while there are already a few white spruce trees that show by their symmetrical shape their ability to withstand the elements.

White pine can be better started on the lower sections of the territory. The catalpa, being a rapid-growing tree and coming into use for railroad ties, was started in the nursery as an experiment, and time alone will tell whether it is suited to the climatic conditions prevailing here. Chestnut and scarlet oak were placed in the nursery primarily to add to the silva of the reservation.

The proper treatment of the reservation from a forestry standpoint is fully set forth in the report of your consulting forester, Mr. Richard T. Fisher, with whom I am co-operating in work of that nature.

If the present plans of road building, reforesting and improvement thinnings are carried to a conclusion, the time will surely come when the reservation will be in a large measure, if not entirely, self-maintaining. The sooner the roads are built to enable us to properly carry on the work, the sooner that end will be attained, as well as safeguarding the reservation from fire.

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The relief map is completed, and will be used as an index of all work of a forestry nature. This map shows very clearly the possibility of enlarging Bolton Pond to a depth of 25 feet, length of 2,000 feet, and an average width of 300 feet, by the construction of a dike about 100 feet north of the present old dam. This dike would need to be but 300 feet long on top, with a height of about 30 feet in the centre and 4 feet at each end. This would add greatly to the attractiveness of the reservation, and it could be well stocked with fish. The work necessary to complete this dike could be carried along gradually, as the funds at our disposal would allow.

During the past year we have built about 1,600 feet of guard fence along the roads, and all has been painted. We have built a very attractive lunch shelter upon the Indian trail near the summit of the mountain, with tables and seats for picnic parties. It is of rustic design, and no finished stock was used in the construction excepting the floors.

A small parcel of land was seized from William R. Howe in the early spring, comprising Taking No. 8; this was needed to supply gravel for the construction of roads.

I can only repeat what I said in my last annual report of the necessity of providing some adequate public convenience upon the summit. The present building is altogether beyond ordinary repairs, and any money expended in this way is simply wasted. What is needed is a new building, or an entire reconstruction of the present building, of a type more suited to the needs of the public, with proper sanitary conditions, provisions for supplying lunch, and a few rooms for those who are desirous of staying over night to see the beauties of a sunset and sunrise, and to see the lights of the neighboring cities and towns. This kind of a structure could be self-sustaining, to say the least. The present building is the subject of much well-deserved criticism from the public, who may reasonably expect to find better conveniences upon a State reservation so well patronized and appreciated as Wachusett.

We have captured six wild deer to add to our herd, and we now have five elk.

Of the routine work, policing, etc., you have been informed

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from time to time, and I will add nothing here to what I have already stated in my other reports.

The South Road is largely built upon land owned by the Woodward heirs, as is also the nursery. This land is held under a lease with option, and it is absolutely necessary that an appropriation be made to enable us to acquire the same. There are also other small parcels which it is necessary for us to acquire, not from any vain desire to increase our holdings, but for the fulfillment of certain specific plans of improvement; and I strongly urge that a petition for an appropriation for the furthering of the plans outlined above be presented to the Legislature.

Respectfully submitted,

GUY H. CHASE,
Superintendent.

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PUBLIC DOCUMENT . . . . . No. 66.

REPORT

OF THE

COMMISSIONERS

ON

WAR RECORDS.

JANUARY, 1906.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Approved by
The State Board of Publication.

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Commonwealth of Massachusetts.

REPORT.

The Commissioners on War Records have the honor to submit the following report.

Soldiers.

The work of this Bureau during the year now drawing to a close has been very satisfactory in its results.

The carding of the muster-in rolls of infantry, cavalry and artillery regiments, batteries and unattached companies of volunteers, is nearly completed. The muster-in rolls of the militia regiments, batteries, unattached companies and cadet corps which served for short terms, remain to be carded.

The individual enlistment papers, which were bound in a number of volumes in the archives of the Adjutant-General, have been completed in the carding; but another unbound lot was discovered in an obscure place in the archives. These have been carded. They may be in some cases duplicates. Still another large collection has been called to the attention of the Bureau within a few days. These, however, are likely to be mostly, perhaps entirely, duplicates, — only a rigid examination will tell; but if there are any whatever which are originals, they must be availed of, for there is no more official record of entry into service of a soldier than his enlistment paper, signed in two places, or, if he cannot write, by mark, duly witnessed.

These enlistment papers were not used in raising troops until the last few months of 1863, and from that time to the close of the war. They represent the enlistment of at least 25,000 men.

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The compiler himself has been at work on the volumes of town reports of men enlisted on the quota of these towns, duly sworn to by the town authorities, and filed, in accordance with law, in the office of the Adjutant-General. These reports prove to be full of discrepancies between names of individuals and the same persons' names on the roster books of the Adjutant-General of Massachusetts, which were made up from muster-in and muster-out rolls of organizations. Notwithstanding these errors, they are indispensable in determining credits, and should give the actual names of citizens of those towns who served in the army and navy.

Continual correction of names and connections of services of the individual in different organizations or branches, naval and military, have been, as suggested in former reports, the leading feature of the year's work. The fact of all such connections being established on a correct basis often has a significance of great moment in determining the good or bad service of a soldier or sailor.

Sailors.

The work of the Bureau in this line has been, as in previous years, very fruitful in results, owing in great measure to the continued courtesy of the Navy Department. The Honorable Secretary of the Navy, the Bureau of Navigation, and the Adjutant and Inspector of the Marine Corps, have furnished all the information which was necessary in determining the whole service of a large number of men.

At this late day it might seem singular that men should be found whose record of service had never before been known; but additional investigation and information derived from various sources continue to enlarge the list of sailors and marines. The additions for the past year count up nearly 50 in the navy alone.

A large number of soldiers were transferred to the navy during the war. This Bureau has been greatly favored in obtaining from Washington the names of vessels served in, and date of final discharge, giving such transferred soldiers a connected record in both branches of the service.

There were at the beginning of the present year more

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than 3,000 sailors and marines whose records were incomplete, many more were incorrect, and connections were lacking. Much has been done this year in perfecting the condition of the navy list in all these particulars. This work is especially complicated; and many cases partially completed have necessarily laid over for years, until data were obtainable which would solve questions heretofore unanswerable.

The commissioners heartily commend the compiler, Col. Edward T. Bouvé, for the exceedingly intelligent interest manifested by him, and the zeal and executive ability with which he has performed his duties.

WILLIAM STOPFORD,
WM. M. OLIN,
HENRY E. TURNER,
Commissioners on War Records.

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PUBLIC DOCUMENT . . . . No. 67.

FIFTH ANNUAL REPORT

OF THE

GREYLOCK COMMISSION.

JANUARY, 1906.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Approved by

The State Board of Publication.

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Commonwealth of Massachusetts.

REPORT OF THE GREYLOCK COMMISSION.

The reservation now contains 6,844 acres; some 1,200 or 1,300 acres more are required to complete it, as at present laid out. The last appropriation of $14,000 enabled us to add 1,384 acres. The county has greatly improved, during the past year, the road leading to the summit from the south. The purposes for which the reservation was made gain more perfect accomplishment each year.

Detailed Items of Expenditures in Land Purchases from Fund of $14,000.

1904.		
Dec. 28.	J. H. Emigh, civil engineer,	$292 80
1905.		
Jan. 19.	Joseph Bissaillon, 35 acres,	300 00
Jan. 24.	A. W. Safford, register deeds,	1 79
Feb. 1.	J. H. Emigh, civil engineer,	282 29
Feb. 14.	Warren B. Dean, 64 acres,	1,000 00
Mar. 15.	H. J. Arnold, 8 acres,	50 00
Mar. 15.	A. W. Safford, register deeds,	1 62
Mar 21.	Leonard A Rider, 97½ acres,	1,000 00
Mar. 21.	A. W. Safford, register deeds,	1 64
Apr. 27.	Paul and Selma Scholz, 200 acres,	2,025 00
Apr. 27.	Andrews Hall, one-half 75 acres,	375 00
Apr. 27.	South Adams Savings Bank, one-half 75 acres,	375 00
Apr. 27.	A. W. Safford, register deeds,	5 74
Apr. 29.	Richmond Iron Company, 207 acres,	2,000 00
Apr. 29.	Richmond Iron Company, 75 acres,	900 00
Apr 29.	A. W. Safford, register deeds,	3 24
May 4.	J. H. Emigh, civil engineer,	162 84
May 8.	Clarence M Smith, attorney,	71 64
May 24.	A. W. Safford, register deeds,	2 39
	Amount carried forward,	$8,850 99

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	Amount brought forward,		$8,850 99
1903.			
May 24.	R. B. Cummings, 345 acres (including right of way, $100),		1,825 00
Apr. 24.	A. W. Safford, register deeds,		4 51
May 24.	Everett and Wm. Andrews, 10 acres,		325 00
July 6.	A. W. Safford, register deeds,		2 39
			$11,007 89
May 5.	Reserved for L. L. Brown estate for two lots taken by right of eminent domain, not yet paid for by the State: —		
	Aldrich lot, 140 acres,	$1,400 00	
	Fisk lot, 128 acres,	896 00	
			2,296 00
	Total,		$13,303 89

LANDS ACQUIRED FROM THE $14,000 APPROPRIATION.

The lands obtained with the $14,000 appropriation, save two small parcels, one of 10 and one of 30 acres, are on the southwest, south and southeast of the reservation as heretofore acquired. Previous to these purchases the southerly line of the reservation only extended to the summit of the westerly of the two peaks as seen from central and southern Berkshire, called Saddle Ball. Land has been added on the west, south and east of that peak. It is well wooded, and thus the forest will be preserved. The southerly line of the reservation, as now laid out, is on the northerly line of the town of Cheshire, except that the Follett lot extends a short distance into Cheshire.

The work involved in obtaining these lands has been somewhat of a task, and has taken time, for the reason that the northerly line of the town of Cheshire had to be determined first; the lands surveyed, that the entire acreage needed could be determined; the process of eminent domain used in part; and the boundaries, in most cases, had to be adjusted between adjoining owners. This work was begun in 1904, and continued until the snow came. Negotiations had to be made with the owners, deeds drawn and titles looked into, before the lands were finally acquired. Surveying, negotiations, title searching, taking of lands by eminent domain, settling the matter of acreage, boundary

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lines, and preparing proper deeds, kept the commission quite busy. The detail work has been great, owing to the location of the lands and the uncertainty of holdings, etc.

This addition to the reservation is especially agreeable to the residents of central and southern Berkshire, for, aside from bringing the lands further south, the woods on the heights, as seen from the lakes and hills at the south, will thus be preserved in all the views of the mountain from that locality. It was to obtain and preserve these forests that the appropriation was made by the State.

The work was accomplished just in time, as shown by the fact that timber has just been cut from the slopes southerly of the new line established for the reservation. The industries at Adams and Cheshire had need of the forest, — indeed, some of the timber had already been bargained for, and some was actually cut and all threatened, when the State happily intervened.

In addition to the preservation of the forest, these purchases will pave the way for making easier the trail used by mountain climbers from Adams and Cheshire harbor, and will provide a way for the much-needed carriage drive on the easterly side of the mountain.

In connection with these purchases certain rights of way have been secured, which, when properly worked, will greatly aid the approaches to the reservation, — for example, a right of way leading down to the highway near the Scholz house; this will benefit the people who use the trolley roads. Further down toward Cheshire harbor another right of way leads from the highway to the Bassett Brook in the line of "the old stage road," thus giving an approach to the southeasterly part of the reservation. That part of the way from Cheshire up past "Jones Nose," which ran through the Cummings farm, which was discontinued as a public way a few years since, will now be secured to the public by a right of way. A right of way will run from the last-named right of way northeasterly to Kitchen Brook, on the north line of Cheshire, making it possible to lay a trail or drive along the northerly line of Cheshire easterly to the Follett lot, owned by the Commonwealth, and thence north-

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erly through that lot to a wood road connecting, on the easterly side of the mountain, with the trail from Cheshire harbor and Adams up the mountain.

In future years, when proper roads are built, people from the south will be able to drive up the west side of the mountain and down the east side. When these roads are built, people from North Adams can drive up the mountain on the north side and drive down towards Adams and then back to North Adams on a far better grade. A right of way has been obtained over the Cummings farm, about half a mile, over the way now called "the temporary road," leading from Lanesborough to the summit. This has been heretofore used by Pittsfield, Lanesborough and Williamstown people, but the right to its use, etc., has now been given by deed. There should be a right obtained from that right southerly to the bridge below, about one mile, or a county road might be laid there. A right of way has been obtained from the south line of the extended reservation southerly to the foot of Round's rock, on the east side of that cliff. This right may in time be extended down over the ridge, southerly, to the Northup road in Lanesborough.

The commission met with great kindness and courtesy in their dealings with the owners of the lands acquired, and, although the questions which arose were often perplexing, all took a friendly interest in the general plan and purpose of the Greylock State Reservation.

What the People of the County of Berkshire have done and contributed toward the Greylock State Reservation.

Under the original act three commissioners were appointed from Berkshire County. They were Prof. John Bascom of Williamstown, for six years; Hon. Francis W. Rockwell of Pittsfield, for four years; Mr. Alfred B. Mole of Adams, for two years.

In 1900 Mr. Mole was reappointed for six years. In 1902 Mr. Rockwell was reappointed for six years. Mr. Mole resigned, having removed to Canada; and Mr. Edward S. Wilkinson of North Adams was appointed to fill the unex-

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pired term. On the death of Mr. Wilkinson, Mr. William H. Sperry was appointed to fill the unexpired term, ending June, 1906.

The commission, January, 1906, consists of Prof. John Bascom, Hon. Francis W. Rockwell and Mr. William H. Sperry. These commissioners have served without compensation and with no charge for personal expenses.

A fund of $1,965.18 was raised by subscription, in order to complete the free gift of the 400 acres on the summit from the old Greylock Park Association, and for other purposes, a free gift of the 400 acres being a condition precedent to the granting of the original appropriation from the State. Contributions were made by Pittsfield people toward opening a temporary road from the south to the summit, beginning even before the original appropriation was made from the State. These subscriptions aggregated but a few hundred dollars, but these amounts were supplemented by a great deal of volunteer work by a few interested people.

This temporary rough mountain road made the work of the county commissioners in building a permanent road far easier. The county of Berkshire grants an annual appropriation of $1,500 for the care and maintenance of the reservation. From this fund the roads have been cared for, trails cut out and a superintendent of the reservation kept; a house has been built for the superintendent and his family.

The county commissioners have already expended about $16,500 on the road leading southerly from the summit.

Miss Susan A. Churchill of Pittsfield, in November, 1905, gave 19½ acres to square out the reservation on the southeast.

JOHN BASCOM,
FRANCIS W. ROCKWELL,
WILLIAM H. SPERRY,
Commissioners.

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PUBLIC DOCUMENT . . . . No. 69.

FOURTH ANNUAL REPORT

OF THE

STATE BOARD OF PUBLICATION.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Commonwealth of Massachusetts.

ANNUAL REPORT.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts.

The State Board of Publication submits herewith its fourth annual report.

The Board has been called upon during the year to examine and approve the usual number of annual and special reports and other documents issued under authority of the Commonwealth. There has been general co-operation on the part of the various departments in the endeavor to secure the fulfilment of the objects for which this Board was created. There is more uniformity in form and arrangement. Extraneous matter has been largely excluded, and the reports more closely limited to a succinct description of the work of the year. Illustrations and maps have not been lavishly used, and have been confined to the subject at hand. The Board still thinks that there is a considerable amount of statistical matter which might with advantage be excluded from the annual reports to the Legislature, and, if needed in printed form, should be printed for distribution in a separate document. A similar position was taken by this Board in regard to lists prepared by the several registration boards of persons duly registered. Such lists are necessary and desirable, but it is more convenient and less expensive to print them separately from the report to the Legislature. In the

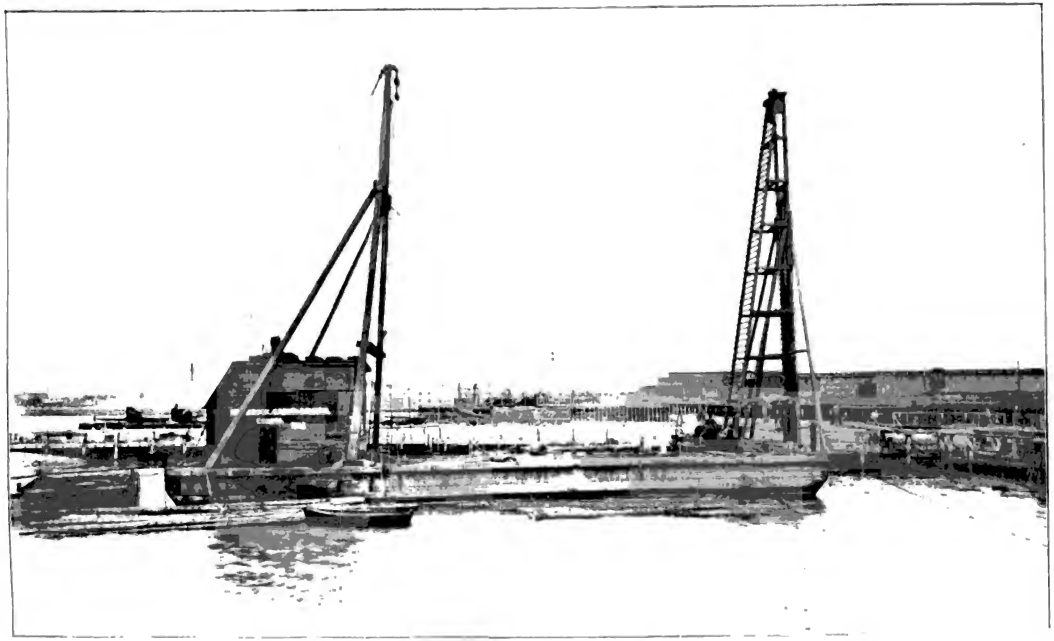
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case of statistical tables this Board has been advised that it has no authority to exclude them where they are required by statute to be included in annual reports. The proper remedy is by legislation amending the statutes, separating such tables from annual reports where not needed for a proper understanding. This Board has already stated that in its opinion it is desirable that recommendations for such legislation should come from the officers of the departments by which such statistics are prepared, rather than from this Board. The Board therefore makes no recommendations for legislation at the present time.

Respectfully submitted,

JAMES W. KIMBALL.
WM. N. DAVENPORT.
JOHN WOODBURY.

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DAM AND LOCK — Driving Foundation Piles for Lock

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PUBLIC DOCUMENT . . . . No. 71.

THIRD ANNUAL REPORT

OF THE

CHARLES RIVER BASIN COMMISSION.

OCTOBER 1, 1905.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
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1906.

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The State Board of Publication.

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CONTENTS.

		PAGE
I.	Organization and Administration,	1
	(*a*) The Commission, Officers and Employees,	1
	(*b*) Offices and Buildings,	2
II.	The Dam and Lock — Construction,	2
	(*a*) The Coffer-dam on the Boston Side of the River,	2
	(*b*) The Coffer-dam on the Cambridge Side of the River,	2
III.	Craigie Temporary Bridge,	3
IV.	The Marginal Conduits,	3
	(*a*) The Boston Marginal Conduit — Construction,	3
	(*b*) The Cambridge Marginal Conduit,	4
V.	Dredging and Pile-driving in the Basin and in Broad and Lechmere Canals,	4
VI.	Approval by the War Department of the Commission's Plans,	4
VII.	Legislation of 1905,	4
VIII.	Additional Legislation needed,	5
	(*a*) Supply of Reports inadequate,	5
	(*b*) Machinery of Drawbridges under Same Control as Machinery of Lock,	5
IX.	Takings of Property,	5
X.	Contracts awarded,	6
XI.	Hearings,	7
XII.	Issue of Bonds,	8
XIII.	Payments to the Sinking Fund,	8
XIV.	Miscellaneous,	8
XV.	Statement of Expenditures,	8

Report of the Chief Engineer,	11
Organization,	11
Dam and Lock,	13
Approval of the War Department,	14
Coffer-dam at the Boston Side of the River,	14
Excavation for the Lock,	16
Foundations of the Lock,	17
Lock Gates,	17
Stop-planks at Lock,	17
Metal at Lock,	18
Heating Plant,	18
Timber Tests,	20
Superstructures,	22
Drawbridge,	22
Operation of Lock and Drawbridge,	23
Pumps,	24
Sluices,	24
Sluice Gates and Gate Valves,	27
Power required,	27

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Report of the Chief Engineer — *Continued.* PAGE

Temporary Bridge and Approaches, ... 28
Boston Marginal Conduit, ... 31
Dredging in the Basin, ... 36
Broad and Lechmere Canals. 36
Land Takings, ... 36
Summary of Borings, ... 36
Summary of Soundings, ... 37
Upland Flow of the Charles River, ... 37
Traffic through Draw of Craigie Bridge and of Temporary Bridge, . . 40
Miscellaneous Engineering Work, ... 40
Storage Shed, ... 40
Contracts, ... 41

Appendix A — Chapter 465 of the Acts of 1903, as amended by Chapter 65 of the Acts of 1905, ... 51
Appendix B — Contracts made during the year ending Sept. 30, 1905, . . 64

ILLUSTRATIONS.

Dam and Lock — Driving Foundation Piles for Lock, ... Frontispiece.
Dam and Lock — Outside Embankment of Coffer-dam at Lock, ... 4
Dam and Lock — Inside Embankment of Coffer-dam at Lock, ... 4
Dam and Lock — Westerly Side of Coffer-dam at Lock, ... 8
Dam and Lock — Bracing in Coffer-dam for Lock, ... 16
Dam and Lock — Sluices in Coffer-dam at Lock, ... 16
Dam and Lock — Guide Piles for Coffer-dam at Lock, ... 44
Dam and Lock — Westerly Side of Coffer-dam and Dredging at Lock, . . 44
Dam and Lock — Coffer-dam, Boiler and Storage Bin at Lock, ... 44
Dam and Lock — Removing Craigie Bridge, ... 44
Temporary Bridge — New Portion at Boston End, ... 4
Temporary Bridge — Reconstructing Old Portion of Bridge, ... 30
Boston Marginal Conduit — Excavation in Sheeted Trench, ... 6
Boston Marginal Conduit — Driving Piles, ... 36
Boston Marginal Conduit — Foundation Piles, ... 46
Boston Marginal Conduit — View at Fruit Street, showing Cableway and Pile-driver, ... 46

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Commonwealth of Massachusetts.

THIRD REPORT OF THE COMMISSION.

To His Excellency the Governor and the Honorable Council of the Commonwealth of Massachusetts.

The Commission appointed under chapter 465 of the Acts of the year 1903, called the Charles River Basin Commission, has the honor to make the following report of its proceedings and expenditures. As required by the Revised Laws, this report is for the year ending Sept. 30, 1905.

I. Organization and Administration.

(*a*) *The Commission, Officers and Employees.*

The membership of the Commission remains the same as in the preceding year: Henry S. Pritchett, chairman, Henry D. Yerxa and Joshua B. Holden. William S. Youngman has continued as secretary, and Hiram A. Miller as chief engineer.

The administrative office force has remained the same during the past year. Eighteen additional engineers and inspectors have been engaged during the year. Other changes and promotions in the engineering force are described in the report of the chief engineer, appended.

By the interpretation placed upon chapter 65 of the Acts of 1905 by the Attorney-General, the responsibility of operating the draw of the Craigie temporary bridge devolved upon the Commission. This advice came within a very few days of the time for opening the new draw; but fortunately a majority of the drawtenders who had gained experience in handling the draw of the old Craigie bridge were willing to enter the service of the Commonwealth. Four additional men were employed

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to complete three shifts of eight hours each. Under the direction of the chief drawtender, Alfred W. Smith, the draw has been successfully operated.

(*b*) *Offices and Buildings.*

The office of the Charles River Basin Commission is located on the sixth floor of the Standish building, No. 367 Boylston Street. The field office of the Commission is located at No. 12 Bridge Street, East Cambridge, near the Cambridge end of Craigie bridge. The Commission also has a storehouse and work shed located at the foot of Leverett Street, near the Boston end of Craigie bridge.

II. The Dam and Lock — Construction.

The contract for the dam and lock (Contract No. 1) was awarded to the lowest bidder who qualified, — Holbrook, Cabot & Rollins Corporation of Boston, — and was signed Jan. 14, 1905. There were eleven bids, ranging from $1,129,530 to $761,900, these figures being based upon quantities as estimated by the Commission's engineers. Work upon this contract was begun March 1, 1905, and has proceeded satisfactorily.

(*a*) *The Coffer-dam on the Boston Side of the River.*

The larger coffer-dam, covering an area of 3½ acres of the river bottom, was nearly completed by Sept. 29, 1905. On that day the closing gap of the entire structure was made at the southwest angle. This coffer-dam is to enclose the work upon the lock and the outlet gates for the Boston marginal conduit. Some of the piles for the foundation of the lock have already been driven, and considerable dredging has been done within the area to be covered by the lock.

Details of the building of the coffer-dam on the Boston side, which is one of the largest structures of its kind ever erected in tide water, may be found in the appended report of the chief engineer.

(*b*) *The Coffer-dam on the Cambridge Side of the River.*

Work upon the smaller coffer-dam, which is to enclose nine sluices, of which the middle and largest one is to serve the

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additional purpose of a lock for small boats, was begun even before the completion of the coffer-dam on the Boston side, and the contractor is making good progress.

III. Craigie Temporary Bridge.

By chapter 65 of the Acts of the year 1905, the Commission was authorized to provide a temporary highway bridge to take the place of old Craigie bridge, upon the site of which the dam is to be constructed. The Commission carried out the plan, stated in its second report, of utilizing the abandoned Boston & Maine Railroad bridge as a temporary highway bridge, by reconstructing a part of the same and by building highway approaches thereto, connecting Bridge Street in Cambridge and Leverett Street in Boston. These extensions were built over the land of the Boston & Maine Railroad, without any expense to the Commonwealth for the use thereof. Work was completed upon the bridge July 5, 1905.

The Acting Secretary of War, in his approval of the plan for the temporary bridge, dated Sept. 1, 1904, required the Commission to maintain a guide pier westerly of the temporary bridge until such time as the Boston & Maine Railroad shall be authorized to construct and maintain the pier. As shown by the accompanying photograph, the Commission's temporary bridge is so located that the railroad cannot construct such pier at this time, but the pier of the temporary bridge serves the same purpose for the time being.

IV. The Marginal Conduits.

(*a*) *The Boston Marginal Conduit — Construction.*

Contract No. 3, for Section 2 of the Boston marginal conduit (Section 1 of the conduit being included in the contract for the dam and lock), was let June 13, 1905, to James Driscoll & Son of Brookline, the lowest bidder, the total bid, according to estimated quantities, amounting to $50,600. There were ten bids. Work was begun almost immediately, and is now nearing successful completion. Under this contract 1,805 linear feet of horseshoe conduit, equivalent in interior area to a 7-foot 3-inch diameter circle, will be built in a trench

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averaging 21 feet in depth below the level of the Charlesbank, at an estimated price averaging about $26 per linear foot, exclusive of engineering and supervision.

(*b*) *The Cambridge Marginal Conduit.*

Throughout the year studies have been made in relation to the Cambridge marginal conduit, but as an important part of that work is affected by the dredging to be done in the Lechmere Canal, no contract has thus far been prepared.

V. Dredging and Pile-driving in the Basin and in Broad and Lechmere Canals.

The Commission is required, by section 4 of chapter 465 of the Acts of 1903, to dredge navigable channels in the basin and in the Broad and Lechmere canals, and to strengthen the walls and wharves thereon by the driving of prime oak piles, 2 feet on centers. Work upon the specifications for the contract for the pile-driving was nearing completion on Sept. 30, 1905.

VI. Approval by the War Department of the Commission's Plans.

Section 2 of the act establishing the Commission provides that "The commission, whenever the Commonwealth has been authorized by the United States to build a dam and lock under the provisions of this act, shall proceed to do the work herein required of it, and shall in the meantime make examinations and plans therefor."

The final plans requiring the approval of the Secretary of War, as above provided, were submitted during the previous year, and approval was given on Oct. 5, 1904.

VII. Legislation of 1905.

The Attorney-General having expressed a doubt as to the authority of the Commission to construct a temporary highway bridge to divert the traffic from Craigie bridge during the construction of the dam, the Commission, in its second report, recommended an amendment to chapter 465 of the Acts of

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DAM AND LOCK — Outside Embankment of Coffer-dam at Lock

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UNIV OF MICH.



DAM AND LOCK — Inside Embankment of Coffer-dam at Lock.

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TEMPORARY BRIDGE — New Portion at Boston End.

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1903, which the Legislature passed, the amendment being chapter 65 of the Acts of 1905, which will be found printed as a part of the act, in Appendix A.

VIII. Additional Legislation needed.

(*a*) *Supply of Reports inadequate.*

Requests for the reports of the Commission have vastly exceeded the supply. The Commission is given for distribution only 350 copies, and it has been found that many important offices in the cities and towns affected by the improvements being carried on by the Commission are without its reports. The Commission therefore recommends that it be authorized to print an edition of 3,000 of this and future reports, also to reprint editions of 1,000 copies each of the first and second reports.

(*b*) *Machinery of Drawbridges under Same Control as Machinery of Lock.*

The studies of the engineers upon plans for the machinery to operate the lock gates and the drawbridges over the lock indicate the desirability of having the machinery of both the drawbridges and the lock under control of the same Board. This arrangement will be in the interest of economy, and will better provide for the safety and convenience of the public using the highway and of vessels passing through the lock. Chapter 465 of the Acts of 1903 gives to the Metropolitan Park Commission the control of the lock, and to the Commissioners of Cambridge Bridges the control of that portion of the dam which serves as a bridge. The Commission recommends that chapter 465 of the Acts of 1903 be amended to give authority over the operation of the drawbridges and over the operation of the lock to the same commission.

IX. Takings of Property.

Certain buildings on piles near the Boston end of Craigie bridge and attached thereto, and the land beneath the same, covered by tide water, claimed by the heirs of Caroline M. McGlenen, were taken Feb. 18, 1905.

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The property of George O. Proctor, next adjoining the Cambridge end of Craigie bridge, and necessary for an approach to the dam, was taken June 26, 1905.

X. Contracts awarded.

Besides the larger contracts, — No. 1 for the dam and lock and No. 3 for a section of the Boston marginal conduit, — seventeen smaller contracts were awarded during the year. Upon all of these, except upon Contract No. 2, with the United States Wood Preserving Company for paving, satisfactory work has been done.

The following is a complete list of contracts let prior to Oct. 1, 1905: —

No.	Name.	Work.	Amount.	Date.
1	Holbrook, Cabot & Rollins Corporation.	Dam and lock in the Charles River.	$801,607 50	Jan. 14, 1905.
2	United States Wood Preserving Company.	Wooden block paving for temporary bridge.	11,700 00	Mar. 23, 1905.
3	James Driscoll & Son, . .	Section 2 of the Boston marginal conduit.	50,600 00	June 13, 1905.
4	Camden Iron Works, . .	Cast-iron pipes and special castings.	5,640 75	July 18, 1905.
5	Henry R. Worthington, .	Furnishing and erecting pumps.	9,533 00	Sept. 30, 1905.
6	Gibby Foundry Company, .	Castings and other metal, .	6,013 74	July 27, 1905.
7	Geo. McQuesten Company, .	Yellow pine lumber for temporary bridge.	12,476 58	Feb. 14, 1905.
8	Rockport Granite Company,	Granite paving blocks for temporary bridge.	1,927 10	Mar. 22, 1905.
9	New England Granite Company.	Granite edgestones for temporary bridge.	525 00	Mar. 22, 1905.
10	General Electric Company, .	Motors for draw in temporary bridge.	812 50	Mar. 22, 1905.
11	E. D. Sawyer Lumber Company.	Spruce lumber for temporary bridge.	4,495 43	Mar. 28, 1905.
12	Harrington, Robinson & Co.,	Tees for wheel-guard on temporary bridge.	817 08	Mar. 29, 1905.
13	Aberthaw Construction Company.	Twisted steel rods for reenforcing concrete.	5,219 20	May 29, 1905.
14	Gibby Foundry Company, .	Castings for overflow, Boston marginal conduit.	736 80	July 22, 1905.
15	Coffin Valve Company, .	Composition at dam and lock.	1,773 44	July 31, 1905.
16	The Boston Bridge Works, .	Brackets for lock gate bearings at lock.	1,301 30	Aug. 2, 1905.
17	The Lumsden & Van Stone Company.	Welded pipe for electric conduits under lock.	3,972 75	Aug. 18, 1905.
18	The Ludlow Valve Manufacturing Company.	Gate valves at lock, . .	861 95	Aug. 25, 1905.
19	The Scherzer Rolling Lift Bridge Company.	Plans, specifications, engineering and patent rights for superstructure, operating machinery, etc., for drawbridge over lock.	4,500 00	Aug. 25, 1905.

A more detailed account of these contracts may be found in the chief engineer's report, appended.

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BOSTON MARGINAL CONDUIT — Excavation in Sheeted Trench.

On the above contracts the following amounts were reserved on monthly estimates, and are not due until the completion of the contracts, or until final settlement: —

Name.	Work.	Amount.
Holbrook, Cabot & Rollins Corporation.	Dam and lock, ...	$17,987 67
United States Wood Preserving Company.	Wooden block paving for temporary bridge.	843 98
James Driscoll & Son, ...	Section 2 of the Boston marginal conduit.	2,289 25
		$21,120 90

XI. Hearings.

During the year the Commission gave the following hearings: to the representatives of the wharf owners on the Broad and Lechmere canals and on Charles River basin, represented by Mr. William A. Hunnewell, Mr. Albert M. Barnes and Mr. J. Frank Wellington, two hearings, relative to work in front of the walls and wharves in the canals and on the basin; to representatives of the barge lines and tow-boats, relative to the bringing of barges through the draw of the temporary bridge; to Mr. George G. Crocker and Mr. Frederic D. Fisk, trustees of the Main Street land trust, relative to the use of their gravel and sand in the construction of the dam; to Mr. George O. Proctor, owner of the land needed for the approach to the dam on the Cambridge side, relative to the proposed taking of his property; to the Commissioners of Cambridge Bridges and representatives of the Boston Elevated Railway Company, relative to paving to be used on the temporary bridge; to Mr. Henry Parkman, Mr. Edmund D. Codman, Mr. Henry G. Vaughan and Dr. J. Payson Clark, representing the Union Boat Club, relative to the location of their boat-house in relation to the Boston marginal conduit; to Mr. A. B. Clements and Mr. Alex. Reed, vice-presidents of the United States Wood Preserving Company, and Mr. B. T. Wheeler, their engineer, relative to remedies for defects in their paving of the temporary bridge.

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XII. Issue of Bonds.

On the twenty-seventh day of December, 1904, the Commission voted to advise the Treasurer of the Commonwealth to make available additional funds to the amount of $400,000 for the year 1905. Bonds to the amount above named were issued under the title of the Charles River basin loan, and sold by the Treasurer. The total issue of bonds on account of the Charles River basin loan, to Oct. 1, 1905, is $650,000.

XIII. Payments to the Sinking Fund.

Payments to the sinking fund of the Charles River basin loan during the year have amounted to $27,384.26. The total payments to the sinking fund, to Oct. 1, 1905, amounted to $38,691.80.

XIV. Miscellaneous.

Fifteen hundred copies of the second annual report of the Commission were printed, of which 100 copies were bound in cloth, at a total cost of $454.27.

XV. Statement of Expenditures.

The total amount of expenditures for the year beginning Oct. 1, 1904, and ending Sept. 30, 1905, is $212,684.67. The total amount from July 29, 1903, the date of the organization of the Commission, to Sept. 30, 1905, is $263,072.14.

The general character of these expenditures is as follows: —

	For the Year ending Sept. 30, 1905.		From Beginning of Work to Sept. 30, 1905.	
Administration.				
Commissioners,	$10,000 00		$21,358 02	
Secretary,	2,147 22		2,883 85	
Clerks and stenographers,	658 84		1,156 84	
Traveling,	76 49		208 79	
Stationery and printing,	914 97		1,167 90	
Postage, express and telegrams,	44 74		52 96	
Furniture and fixtures,	53 86		312 11	
Alterations and repairs of building,	-		128 10	
Telephone and lighting,	79 71		140 41	
Rent,	285 72		730 24	
Miscellaneous expenses,	41 52		92 62	
		$14,303 07		$27,695 02
Amounts carried forward,		$14,303 07		$27,695 02

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DAM AND LOCK — Westerly Side of Coffer-dam at Lock.

	For the Year ending Sept. 30, 1905.		From Beginning of Work to Sept. 30, 1905.	
Amounts brought forward,		$14,303 07		$27,695 62
Engineering.				
Chief, principal assistant and division engineers,	$10,725 00		$20,594 24	
Engineering assistants,	16,481 90		26,975 99	
Consulting engineers,	2,400 00		5,300 00	
Inspectors,	3,118 46		3,118 46	
Architect,	–		582 00	
Traveling,	173 69		363 55	
Wagon hire,	8 50		58 50	
Stationery and printing,	975 10		1,654 67	
Postage, express and telegrams,	39 81		80 09	
Instruments and tools,	639 05		2,731 86	
Engineering and drafting supplies,	235 79		532 72	
Books, maps and photographs,	414 45		614 48	
Furniture and fixtures,	515 08		1,888 99	
Alterations and repairs of building: —				
Main office,	–		1,092 14	
Sub-office,	214 06		214 06	
Telephone and lighting, — main office,	178 87		377 88	
Telephone, lighting, heating and care of building, — sub-office,	139 12		194 88	
Rent, — main office,	1,714 32		3,446 47	
Rent of field office,	146 45		251 45	
Unclassified supplies,	52 40		65 94	
Miscellaneous expenses,	71 69		95 03	
		38,244 64		70,234 30
Construction — Preliminary.				
Labor,	$854 83		$5,000 94	
Traveling,	92		19 08	
Water rates,	–		3 45	
Freight and express,	50 25		51 17	
Jobbing and repairing,	1 04		35 68	
Tools, machinery, appliances and hardware supplies,	75 34		185 76	
Castings, ironwork and metals,	120 58		201 54	
Iron pipe and valves,	19 81		98 96	
Fuel, oil and waste,	16 80		62 65	
Lumber,	229 54		338 08	
Cement,	–		24 75	
Sand,	–		3 00	
Unclassified supplies,	10 99		14 69	
Miscellaneous expenses,	10 23		355 84	
		1,330 33		6,395 59
Construction — Contracts.				
Contract No. 1, Holbrook, Cabot & Rollins Corporation,	$101,980 12		$101,980 12	
Contract No. 2, United States Wood Preserving Co.,	4,782 52		4,782 52	
Contract No. 3, James Driscoll & Son,	12,072 44		12,072 44	
Contract No. 7, Geo. McQuesten Co.,	12,476 58		12,476 58	
Contract No. 8, Rockport Granite Co.,	1,927 10		1,927 10	
Contract No. 9, New England Granite Co.,	525 00		525 00	
Contract No. 10, General Electric Co.,	812 50		812 50	
Contract No. 11, E. D. Sawyer Lumber Co.,	4,495 43		4,495 43	
Contract No. 12, Harrington, Robinson & Co.,	817 08		817 08	
Contract No. 13, Aberthaw Construction Co.,	4,614 80		4,614 80	
Contract No. 15, Coffin Valve Co.,	2 35		2 35	
		145,355 92		145,355 92
Construction — Additional.				
Labor,	$4,394 74		$4,394 74	
Traveling,	86		86	
Freight and express,	4 30		4 30	
Jobbing and repairing,	172 97		172 97	
Tools, machinery, appliances and hardware supplies,	4,695 66		4,695 66	
Castings, ironwork and metals,	196 33		196 33	
Iron pipe,	6 91		6 91	
Paint,	7 00		7 00	
Fuel, oil and waste,	38 53		38 53	
Lumber,	3,088 91		3,088 91	
Stone,	4 00		4 00	
Amounts carried forward,	$12,610 21	$199,293 96	$12,610 21	$249,681 43

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	For the Year ending Sept. 30, 1905.		From Beginning of Work to Sept. 30, 1905.	
Amounts brought forward,	$12,610 21	$190,203 96	$12,610 21	$249,681 43
Construction — Additional — Con.				
Sand,	4 00		4 00	
Corporation work,	266 97		266 97	
Unclassified supplies,	188 96		188 96	
Miscellaneous expenses,	160 88		160 88	
		13,231 02		13,231 02
Real Estate.				
Legal and expert,	$159 69		$159 69	
		159 69		159 69
Totals,		$212,684 67		$263,072 14

The foregoing expenditures have been distributed among the various objects or works as follows : —

	For the Year ending Sept. 30, 1905.	From Beginning of Work to Sept. 30, 1905.
Administration, applicable to all parts of the work,	$14,303 07	$27,695 62
Dam,	27,508 19	38,881 31
Lock,	61,160 22	69,256 21
Temporary bridge and approaches,	76,884 81	77,869 65
Drawbridge,	8,143 00	8,859 56
Highway,	–	60 92
Dredging in basin,	153 62	674 91
Broad Canal,	1,006 39	2,861 12
Lechmere Canal,	628 28	1,537 90
Boston marginal conduit,	26,619 17	34,206 19
Cambridge marginal conduit,	187 85	929 75
Totals,	$212,684 67	$263,072 14

The report of the chief engineer follows.

In Appendix A will be found, indexed, chapter 465 of the Acts of 1903, as amended by chapter 65 of the Acts of 1905.

In general, the Commission desires to report a successful year of work and progress, at as rapid a rate as it had anticipated. The Commission desires at the same time to express its indebtedness to the secretary and to the efficient engineering staff for the results achieved.

Respectfully submitted,

HENRY S. PRITCHETT,
HENRY D. YERXA,
JOSHUA B. HOLDEN,
Charles River Basin Commission.

BOSTON, Jan. 4, 1906.

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REPORT OF THE CHIEF ENGINEER.

To the Charles River Basin Commission.

GENTLEMEN : — The following is a report of the work of the engineering department for the year ending Sept. 30, 1905.

ORGANIZATION.

Mr. Frank E. Winsor continued as division engineer until May 21, 1905, when he was promoted to the position of principal assistant engineer. His duties consisted mainly of designing, drafting and other office work, although he occasionally supervised some of the field work.

Mr. John L. Howard continued as division engineer, in charge of field work.

Mr. Frederic P. Stearns continued to act as consulting engineer.

Mr. Guy Lowell was consulted in architecture and landscape architecture.

Mr. J. R. Worcester was consulted in regard to designs for lock gates and appurtenances, and other problems connected with structural steel work.

The engineering force at the beginning of the year numbered 18, and was increased from time to time as the work required, until at the end of the year it numbered 35.

The names of the assistants in the engineering department, not mentioned above, who have been employed for not less than one month, are given below, with the positions last held, together with an indication of the work performed by them : —

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Assistant Engineers.

JOHN N. FERGUSON,	Hydraulic studies, estimates and miscellaneous office work, until June 15, 1905; subsequently, field work.
EDWARD C. SHERMAN,	Designs and studies for steel work and masonry.
J. ALBERT HOLMES,	Field work.
LEONARD P. WOOD,	Hydraulic studies and designs for masonry.
WILLIAM C. PICKERSGILL,	Designs and studies for masonry, tests of yellow pine timber, and miscellaneous office work.

Inspectors.

DANIEL A. STORY,	Inspector of piling and bridge work.
ARTHUR I. PLAISTED,	Engineering inspector.
FRANKLIN L. MASON,	Inspector of masonry.
DANIEL J. SULLIVAN,	Inspector of piling, bridge work and paving.
WALTER N. CHARLES,	Engineering inspector.
GEORGE L. BOSWORTH,	Assistant inspector.

Draftsmen, Instrumentmen, etc.

WALTON H. SEARS,	Mechanical assistant.
WALTER R. KATTELLE,	Draftsman.
JENNIE L. RAWSON,	Clerk and stenographer, — administrative work, accounts and letters.
HERBERT W. OLMSTED,	Instrumentman.
MORTON F. SANBORN,	Instrumentman.
FREDERIC C. H. EICHORN,	Instrumentman.
ROBERT E. BARRETT,	Instrumentman.
WALTER E. WHEELER,	Instrumentman.
NORMAN C. MCNEIL,	Instrumentman.
JOHN M. O'DONOGHUE,	Instrumentman.
ETHELYN B. MARLATTE,	Clerk and stenographer.
ALBERT J. HOLMES,	Draftsman.
JAMES E. BARLOW,	Rodman.
BERTRAM I. HALL,	Rodman.
THOMAS J. LONG,	Rodman.
FRANK V. ANDREWS,	Rodman.
EDITH F. WHITE,	Stenographer.
FRANK A. MCDONALD,	Rodman.
EDWARD L. LINCOLN,	Rodman.
ALFRED WM. TREEN,	Clerk and messenger.

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Mr. Arthur W. Tidd, who was employed as assistant engineer during the greater portion of the previous year, resigned on Oct. 15, 1904, to accept a position as assistant engineer with the Aqueduct Commission of the city of New York.

In addition to the above regular employees, Mr. Herbert L. Sherman, having a chemical and cement-testing office at 220 Devonshire Street, Boston, had charge of cement testing; and Mr. William R. Conard of Burlington, N. J., had charge of inspection of pipes manufactured at Camden, N. J., under a contract with the Camden Iron Works.

The principal engineering office was continued at 367 Boylston Street, Boston, and the office for the field force was continued at 12 Bridge Street, East Cambridge. This field office was enlarged during the latter part of March by the occupancy of the entire space of the first and second floors. On the second floor a partition was removed and three additional windows put in, making a drafting room, 24 feet by 16 feet, well lighted.

Dam and Lock.

This important portion of the work to be done by the Commission occupied the engineering staff, both in the office and in the field, for the larger proportion of the year. A general description of this, together with the construction work thereon, is submitted herewith.

The contract plans were well advanced at the end of the previous year, and the specifications and plans were completed in time to advertise for bids early in November, bids being opened on Dec. 20, 1904. These plans were of necessity somewhat general in character, and details were left for future consideration. These details very largely occupied the attention of the office force during the year.

Working drawings were in progress during the year, of masonry, pile plans, steel reenforcement of concrete, and miscellaneous details.

It having been decided to make a taking of the entire property in Cambridge between Lechmere Canal and Bridge Street, extending from the river to Commercial Avenue, and also to fill between the rest pier at the up-stream end of the lock and

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the Boston side of the river, a new plan, approved by the consulting landscape architect, was made, a copy of which (Plan No. 2) is submitted herewith.

Approval of the War Department.

The final plans requiring the approval of the Secretary of War, submitted during the previous year, were approved on Oct. 5, 1904, thereby removing the last obstacle in the way of actual construction.

Coffer-dam at the Boston Side of the River.

The contract for the dam and lock provides that the contractor may use the design of coffer-dams submitted with the contract plans, or such other design of his own as the engineer may approve.

Various designs for the coffer-dam on the Boston side were considered by the contractor, and a detailed study was given to the merits of the various suggestions. A final type of dam was submitted by the contractor and approved by the engineer, which differed mainly from the original design, in that the two rows of sheeting called for were spaced 8 feet instead of 30 feet apart, and additional earth filling was required in order to give substantially the same stability as the original design. As built, the coffer-dam consists of two rows of 6-inch yellow pine sheeting, "square edge" classification, 8 feet apart in the clear, with 1½-inch by 3-inch spruce splines. Round guide piles of spruce or Norway pine, 12 inches in diameter at the butt, were driven 10 feet on centers, with one spurshore pile at each bent, first on one side and then on the other. There are two lines of lower wale timbers, consisting of 6-inch by 10-inch yellow pine, with centers at elevation 102.5, and between the round piles at the same elevation were fitted 10-inch by 10-inch yellow pine sticks. These were bolted to each other with three ¾-inch bolts, and at each end of the 10-inch by 10-inch sticks are 1¼-inch diameter tie rods, some 12 feet long, extending between each line of sheeting, wales, etc. The centers of the upper wales, also 6-inch by 10-inch yellow pine, are at elevation 110.5, and between the round piles at this elevation are 6-inch

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by 12-inch, or larger, yellow pine filling pieces. These were bolted through with two ¾-inch bolts, and through each end of the filling pieces were bolted 1¼-inch tie rods, some 12 feet long. Between the two lines of sheeting at both the top and bottom wales, opposite the round piles, were placed 8-inch by 10-inch yellow pine braces, strengthened by 3-inch by 10-inch spruce cross-bracing spiked to the large braces. The filling between the two rows of vertical sheeting is largely of a fine, silty sand, mixed in places with clay and gravel from the channels in the lower harbor. The earth filling on the river side of the coffer-dam is mainly of clay and gravel, and approximates a 2 to 1 slope, with the top at elevation 105. The top of the embankment on the lock side is at elevation 110, with a width of 25 feet and a side slope of 2 to 1. For a depth of 4 feet on top and some 10 feet on the slope the embankment consists of sand and gravel, to allow the embankment to drain freely when the coffer-dam should be pumped out. The portion next the sheeting is made of more impervious material. Where the ends of the coffer-dam come in contact with the Charlesbank wall, a trench was made through the wall after the stones had been entirely removed, and the two lines of sheeting were brought together a short distance inside of the wall. For boring the holes required for the bolts and tie rods in the coffer-dam, the contractor fitted up a small scow with an air-compressor plant, and most of the holes were bored by the aid of compressed air.

Early in the spring the drawtenders' house and other buildings on the down-stream side of the bridge were removed. In June piles were driven at the southerly end of the coffer-dam, to support the sluices.

In order to permit the water to rise and fall with the tide inside the coffer-dam when the closure in the sheeting was being made, the contract provided that the sluices in this coffer-dam should have an area of not less than 36 square feet, and that the middle of the sluices should not be above elevation 102.5. As built, there were two openings, each 5 feet 6 inches high, the larger opening being 5 feet wide and the smaller one 2 feet 6 inches wide. These extended through the embankment in the dam in one flume about 40 feet long, 5 feet 6

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inches high, and tapering from a width of 14 feet at one end to a width of 10 feet at the other end. The gates for the sluices were built of 6-inch splined yellow pine timber, and were fitted with a rack and pinion for hand operation.

At 7 A.M. on July 5, the temporary bridge having been completed, the work of tearing down the old draw and other portions of the bridge which interfered with the construction of the coffer-dam was begun; and by the end of the week all of the draw had been removed, and the piling for the coffer-dam was being driven where the bridge had been removed.

In order to protect the lower end of the coffer-dam from being damaged by vessels passing through the draw of the temporary bridge, a fender was built some 15 feet below the lower line of sheeting, consisting of piles 8 feet on centers, with a spurshore to each pile and double spurshores on alternate piles, and with three lines of double girder caps, — one at mean tide, one at mean high water and the other at about elevation 115. On top of the top row was placed an 8-inch by 16-inch rider cap.

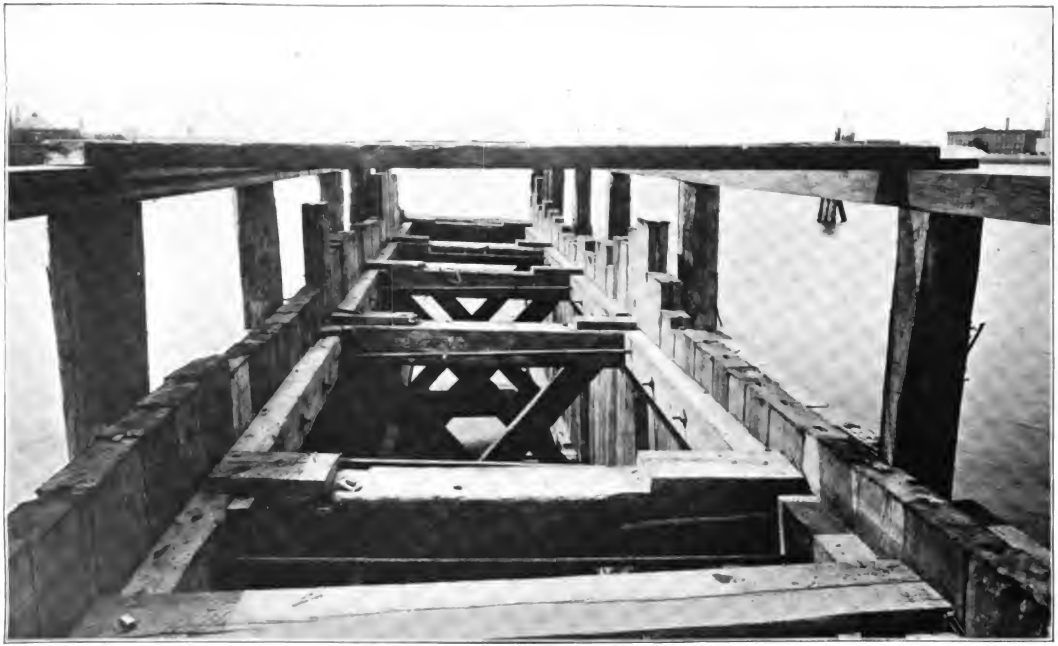
On September 29 the closing gap in the entire structure was made at the southwest angle.

In the construction of this coffer-dam 437 round piles, 746 M. feet B. M. of yellow pine lumber, 606 scow loads and 4,617 cart loads of earth were used. The earth delivered by scows came from the excavations for the lock, from the river above the Cambridge bridge and from the dredging in the harbor. The earth delivered by carts came from the excavations for the Boston marginal conduit and for the subway under construction by the Boston Transit Commission, and from other sources.

Excavation for the Lock.

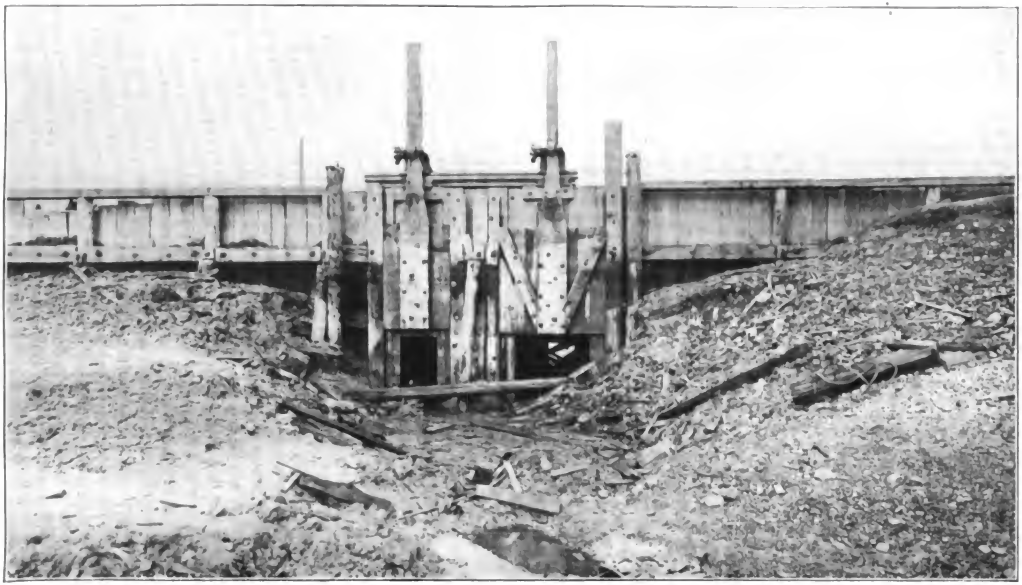
The excavation for the foundation of the lock was started April 27. The surface material, being considered unsatisfactory for use in the coffer-dam, was deposited within the cross-section of the dam, as near the Cambridge shore as it could be placed without interfering with the construction of the sluices. The remainder of the material excavated at the lock was used in the construction of the coffer-dam.

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DAM AND LOCK — Bracing in Coffer-dam for Lock.

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DAM AND LOCK — Sluices in Coffer-dam at Lock.

Foundations of the Lock.

At the request of the contractor, permission was given, before the lock was pumped out, to drive some 500 piles at the lower 40 feet of the lock, where the masonry projected into the inside slope of the coffer-dam; with the understanding that if, after the coffer-dam was pumped out, any piles were found to be out of place or improperly driven, the contractor would drive other piles in the proper places without expense to the Commission.

Lock Gates.

The question of final design of lock gates was taken up about the middle of the year, and the various conditions to which these gates might be exposed in extreme cases were considered in making the design. It was thought desirable to provide for the possibility of the lock being used as a flood sluice during extraordinary upland floods. This necessitates that both gates be open at the same time, the last one being opened on a falling tide, when the tide and basin are at the same level. The gates have been so designed that in case this use should be attempted unsuccessfully, through failure to get the gate open more than part way before the falling tide causes sufficient pressure on the up-stream side of the gate to prevent the completion of the operation, the consequent pressure due to the head of water on the basin side of the gate would do it no injury. This necessitates very heavy construction for the top girders and for the bearings for the lock gates.

The lower lock gate has been designed in detail. The bearings and other metal work connected with the gates have also been decided upon. The filling gates, also, which are to be a part of the lock gate structures, were considered in detail. The designs for the operating mechanism, which will consist of chains running over sprocket wheels and driven by electric motors, had been carried nearly to completion at the end of the year.

Stop-planks at Lock.

The lock has been so designed that, if necessary, stop-planks can be placed at either end of the lock, and the lock pumped out. The design of these stop-planks, which are required to

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span an opening 45 feet in width, with a maximum depth on the down-stream side of about 32 feet and on the up-stream side of 21 feet, involved considerable study. At the end of the year details had been completed, which consist of trusses spanning the lock near the top and supporting two vertical steel girders, which divide the width of the lock into three spaces, with provision for stop-planks to span these spaces. These stop-planks are of wood, reenforced with a sufficient amount of metal to give them the required strength and to insure their sinking in the water.

Metal at Lock.

Detail plans of a considerable part of the metal at the lock were made, and the work contracted for in the latter part of the year. These plans included steel for reenforcing concrete; adjustable bearings for the lock gates, capable of taking the maximum pressures due to extreme conditions on the gates; manhole frames and covers; anchorages for holding lock gate bearing timbers in place in the masonry; steel brackets for supporting rear lock gate bearings; bed plates for operating machinery; cast-iron pipe for suction and discharge from pump-wells, for conduit under lock and for gage pipes; and lap-welded pipes for electric ducts under the lock.

The question of specifications for steel rods for reenforcing the masonry was given detailed study; and a schedule for steel which it was estimated might possibly be required during the season of 1905 was prepared, and a contract let on May 29 for these rods.

Heating Plant.

The legislative act establishing the Commission requires the lock to be operated throughout the year, and much study was made of various methods for keeping the lock gates free from ice. Tentative designs were made of a boiler plant in the lower lock gate-house, of sufficient size to heat both lock gates in such manner as to permit their operation in the coldest weather, to heat the superstructures at the two lock gates, and to provide sufficient heat at the sluices to warm the gate-chambers and to insure the sluice gates from freezing.

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In connection with the design for heating, it was considered desirable to get more positive data than existed in any available technical literature, from which to draw conclusions as to the size of plant required and the best method of manipulation. The problem appeared to be a novel one, and as very little satisfactory information could be obtained in reference to it, it was decided to make some experiments, to determine, if possible, some of the doubtful factors. These experiments may be briefly described as follows: —

The experiments were made at the upper Mystic Lake. The old gate-house of the Boston water works, located on the Medford shore near the dam, made a satisfactory boiler house and a place to store instruments and tools. This house was kindly placed at the disposal of the Commission by the Metropolitan Water and Sewerage Board.

The experimental apparatus consisted of a 5 horse-power vertical tubular boiler and two concentric steel tanks 5 feet high, the outer tank being 4 feet in diameter and the inner tank 3 feet in diameter, bolted together at the bottom, thus leaving a 6-inch annular space between the tanks, in which were placed two double-turn coils of 1-inch pipe, each entering from and returning to the interior of the inner tank, and so arranged that steam could be supplied to either or both. In addition to these coils, there was at the bottom of the annular space a third coil, of ¾-inch pipe perforated with 1/16-inch diameter holes pitched about 2 inches. Steam could also be supplied to this coil. The tanks were suspended by chain falls from an overhead framework built upon an old timber structure in the pond near the gate-house. The tanks were so suspended that they could be raised entirely above the surface of the water, or lowered so as to be almost entirely submerged. The method of conducting the tests was as follows: —

The tanks were partially submerged and allowed to freeze in, usually over night or longer. They were then warmed by one of the following methods until free from the surrounding ice, and sufficient heat was applied to prevent the further formation of ice around them. Three methods of heating were tried: No. 1, using the radiator coils of 1-inch pipe, with air in the annular space; No. 2, using these same coils with water in the

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annular space; No. 3, using the perforated coil of ¾-inch pipe to blow steam into water in the annular space. Two operators were necessary in conducting the experiments: one to fire the boiler and make the necessary readings of thermometers, etc., which were outside of the tanks; the other to control the steam flow into the coils and to make readings of the instruments inside the tanks; the latter operator remaining in the tanks during the entire test, which usually lasted from one to three hours. The following observations were made at regular intervals: steam pressure at boiler; atmospheric temperature; temperature of the condensed steam; pressure and temperature of the steam entering the coils; and temperature of the air or water in the annular space at elevations of 4 inches, 16 inches, 28 inches, 40 inches and 52 inches above the bottom. The condensation was collected and weighed. All surfaces from which heat could be radiated uselessly were covered with asbestos or hair felt. Drip cocks were placed at proper points. In this way all but a small percentage of the heat applied to the tanks was radiated at the outer skin, and could be measured.

Thirteen tests were made in all, and the data has been analyzed and tabulated. The results were as consistent as could be expected, and were of considerable value in calculating the amount of heat which will be consumed in warming the lock gates and determining the required capacity of the boiler plant.

Timber Tests.

The various structures connected with the work at the dam and lock will require the use of a considerable amount of timber under water; and at certain points it is desirable to obtain positive information in regard to the behavior of timber under these conditions. This is particularly true of the bearings for the large lock gates. It is proposed to use timber on the bearing surfaces on each side of the lock gates; and since these gates in opening are to slide back between the timber faces into recesses, provision is necessary for sufficient clearance for moving the gates without binding, and at the same time it is desirable, for various reasons, to keep this clearance as small as is safe. Information in regard to the amount of swelling to be expected in timber to be used in water, and the

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variations of timber alternately wet and dry, was desired. The possibility of using timber treated by a preservative process, which would exclude moisture and thus prevent swelling, was considered, and various preservative processes were investigated. It was found that the only preservative which is insoluble, and thus can be used to advantage on timber immersed in water, is one containing creosote. It was decided to make some experiments to determine the value of the preservative in excluding moisture, and to learn the amount of increase in dimensions of both treated and untreated timber when immersed in water. Ten pieces of long-leaf yellow pine, 4 inches by 12 inches, 6 inches by 14 inches and 12 inches by 12 inches, about 24 feet long, and four pieces of white oak, 4 inches by 12 inches, 8 inches by 8 inches and 14 inches by 14 inches, about 20 feet long, were cut in halves, and one half of each timber was treated by a creosote preservative process, while the other half was left untreated. These timbers, when well dried, were weighed and carefully measured by the aid of a micrometer caliper to .001 of an inch, after which they were put in water and weighed and measured from time to time for some three months. At the end of this time the greater part of these timbers had apparently reached the maximum of increase in weight and size. The variations in weight and dimensions of the treated timbers were found to be very slight; but since it was noted that some of the preservative appeared to be washing out, a further increase might be expected. The increase in dimensions was far greater in the untreated than in the treated timbers. For the six untreated long-leaf yellow pine sticks the increase in dimensions varied from a minimum of .04 per cent. to a maximum of 1.03 per cent., with an average of .43 per cent.; the stick giving the maximum value contained a large percentage of sap-wood, and if this stick were neglected, the maximum would become .53 per cent. and the average .31 per cent. For the four oak sticks the increase in dimensions varied from a minimum of .12 per cent. to a maximum of .33 per cent., with an average of .21 per cent. Some of the timbers have been left soaking in the tanks, so that further measurements may be made to demonstrate with greater certainty that the ultimate increase in weight and dimensions has been reached.

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In connection with and following these tests made on the larger timbers, similar tests were made upon creosoted paving blocks. Thirty-three blocks were used in this set of tests. As it was possible to weigh the blocks much more accurately than the large timbers, the determination of the maximum absorption was much more accurately made. To determine the desirability of the preservative and to approximate an accelerated weathering, some of the specimens were dried after being immersed, and then immersed again; and others, when the maximum absorption was reached, were placed in cold storage and frozen.

A considerable part of the work of the timber tests was done at the Massachusetts Institute of Technology, being in part connected with thesis work.

Superstructures.

The superstructures over the two lock gates were studied in detail, and preliminary designs were made. The architectural features were studied in sufficient detail to settle definitely on the foundations required, which it is expected will be included in the contract for the dam and lock.

Drawbridge.

Some form of bascule bridge was decided upon during the previous year. Various bridges of this type were investigated, and detail studies made of their advantages and disadvantages. The type of bridge designed and patented by The Scherzer Rolling Lift Bridge Company was finally decided upon, and a contract made with that company on August 25 for the design of a single-leaf structure in two parts. Some of the advantages of a single-leaf structure are that it can be raised entirely on the Cambridge side of the lock, and will permit an unobstructed view from the operator's tower, as described below, of the pier below the draw; also, that it permits of somewhat simpler overhead construction for the trolley poles and wires of the electric railway, and does away with the opening across the roadway at the middle of the lock, which would be necessary in a double-leaf structure. The bridge is to be built in halves, operated by independent motors. This plan was adopted

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principally on account of the width of the bridge, which is 85 feet. It is expected that it may be found desirable to operate one half at a time, before vessels have cleared the entire bridge, and thus shorten the time during which street traffic will be interrupted. It is also desirable to have a bridge operated in halves in order that, in case of accidents, one half of the bridge may be maintained for traffic while the other half is being repaired.

The adoption of this type of bridge necessitated considerable work in the study and design of retaining walls, etc., for the substructure.

Operation of Lock and Drawbridge.

Much study was given to the question of operation of the lock for passage of vessels, and to designs for warping machinery. Detail studies were made for a number of warping machines, but no positive conclusion had been reached at the end of the year. The time required for vessels of various sizes to pass through the lock and draw was calculated as closely as the various uncertainties of the problem would permit. In this connection a number of foreign articles in reference to the operation of lock gates, canals, etc., were partially translated.

Careful studies were made of various methods for operating the drawbridge, lock gates, filling gates, warping machines, etc., to the end that highway traffic be interrupted as short a time as possible, and that the passage of vessels through the lock be made with as great rapidity as is consistent with safety. A tentative decision was reached to have all the operations connected with opening and closing the drawbridge, opening and closing the lock gates, and controlling the filling gates for balancing the water level in the lock, performed at a single point and under the control of a single operator, this operator to be located in the tower, which will be made a part of the building over the lower lock gate recess. The tower is to be of sufficient height to enable the operator to get a substantially unobstructed view across the drawbridge, down the river and along the lock to the upper pier in the basin. The arrangement will be similar in principle to that of a railroad switch tower, and the responsibility for the manipulation of all the apparatus at this point will rest almost entirely on a single

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individual. It may be noted that an arrangement of this kind will be somewhat difficult under existing legislation, as it is provided that the drawbridge and its operation be under the control of the Boston and Cambridge Bridge Commission, and that the lock and its operation be under the control of the Metropolitan Park Commission. It is therefore suggested that the attention of the Legislature be called to this point, and that a modification of the law, more easily to permit of this arrangement, be asked for.

Pumps.

The pumping plants required for pumping out the upper and lower lock gate recesses at the lock and the main lock itself will consist of a 13,000-gallon-per-minute, vertical, centrifugal pump, with direct-connected variable-speed motor at the lower lock gate-house; and a 5,000-gallon-per-minute, vertical, centrifugal pump, with direct-connected variable-speed motor at the upper lock gate-house. The pumping plant required at the sluices will consist of a 1,200-gallon-per-minute, horizontal pump, with direct-connected variable-speed motor, designed so that it can be occasionally submerged without injury.

Studies for the capacities and general design for these pumps were made, and specifications were drawn up and bids received on July 25. The bids, with accompanying designs and guaranteed efficiencies, were studied in detail, and as accurate analyses as possible made of the advantages of the various types of pumps and appurtenances. Consideration was given to the merits of design and details of construction, as well as to the price; and the previous experience of bidders in building pumps of the type required to operate under the conditions which will exist at the dam and lock was carefully looked up. Pumping plants installed at Schenectady and Buffalo, N. Y., were visited in connection with these studies.

A contract for these three pumps has been made.

Sluices.

Other detail studies of the sluices not mentioned elsewhere include detail design of steel and concrete roof, studies of discharge through the sluices under various conditions of river flow and tides, and study of design of gates for the central

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sluice, which will be fitted to serve also as a lock for small boats.

The hydraulic conditions determining the capacity of the sluices and other openings through the dam are as follows: —

The largest freshet of which any record is obtainable occurred in February, 1886. During this freshet records were kept of the discharge over the dam and through the wheels of the Boston Manufacturing Company, near Moody Street, Waltham. These records, supplemented by additional levels and measurements, have been carefully studied, and it is estimated that the maximum discharge at this point during the flood was 3,968 cubic feet per second. The watershed of the Charles River above the dam of the Boston Manufacturing Company, as shown on Plan No. 1, is 251 square miles, but a portion of the flow of the river passes through Mother Brook into the Neponset River. The amount passing into Mother Brook is regulated by two weirs, one in the Charles River a short distance below the Newton water works pumping station, the other in Mother Brook in Dedham just above Washington Street. These two weirs are at the same elevation, the one in the Charles River being 60 feet long, while the one in Mother Brook has a length of only 30 feet. This arrangement of weirs is intended to divert one-third of the flow of the river into Mother Brook, leaving two-thirds to pass down the Charles. It is probable, however, that in times of flood more than two-thirds of the water passes down the Charles, as there is low ground at one end of this weir over which water may flow at times of extreme flood, while the banks on the sides of the weir in Mother Brook are high. The area of the watershed above these weirs is 211 square miles. Assuming that one-third of this area, or 70 square miles, is tributary to Mother Brook, there remain, of the total of 251 square miles above the Boston Manufacturing Company's dam, 181 square miles (including the area tributary to the Cambridge storage reservoirs, which at this time were, no doubt, discharging into the Charles) contributing to the estimated discharge of 3,968 cubic feet per second, or 21.9 cubic feet per second per square mile. The additional area of the watershed between the Boston Manufacturing Company's dam and Craigie bridge is 57 square miles, making a total of

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238 square miles, and, assuming that the run-off of the whole watershed was at the rate of 21.9 cubic feet per second per square mile, the total discharge at Craigie bridge would have been 5,212 cubic feet per second. This estimated run-off is probably in excess of the actual, for the following reasons: —

First. — As stated above, probably more than two-thirds of the run-off above the weirs passed down the Charles River, and consequently the area from which it came was more than two-thirds of the total area; and, the area above the Boston Manufacturing Company's dam being more than 181 square miles, the run-off was less than 21.9 cubic feet per second per square mile.

Second. — The maximum rate of flow does not occur at Waltham until two or three days after the maximum rate of rainfall. The maximum rate of flow from the 57 square miles below Waltham, on the other hand, follows but a few hours after the maximum rate of rainfall, and would have passed before the crest of the main flood arrived.

In designing the sluices and other openings at the dam, it has been assumed that the waterways would be sufficient if they were capable of passing 5,700 cubic feet per second (some 10 per cent. in excess of the flood of February, 1886) without raising the basin above elevation 111 referred to a base 100 feet below Boston city base, in conjunction with continuous tides rising to elevation 113, although the basin should not be drawn down in advance below elevation 108. There is an average of about eight tides per year which rise above elevation 113, and one per year above elevation 114.

Diagram No. 1 shows the proposed openings in the dam available for flood discharge.

Diagram No. 2 shows the fluctuations in the basin at high spring, low neap and mean tides for different rates of discharge.

In case of a discharge of more than 5,700 cubic feet per second against continuous high spring tides rising to elevation 113, the basin would rise above elevation 111 unless both lock gates were open at a time when the basin and the harbor were at equilibrium and the lock used as an additional flood sluice, the lock gates, as stated under the heading of "Lock Gates," having been designed to permit of such use.

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The condition which would give the highest water level in the basin would doubtless be the result of the coincidence of a large flood and a series of tides such as occurred during the storm of November, 1898, in which the steamer "Portland" was lost; these tides are characterized by both high crests and high low water, and are believed to be the most unfavorable series of tides on record for the discharge of upland flow at the dam.

As an extreme case, a study was made of the coincidence of these tides with an upland flow of 7,000 cubic feet per second. It is estimated that under these conditions the basin, if the lock gates remain closed, would reach a maximum elevation of 113.4, and would remain above elevation 113 for about four hours, and above elevation 111 for a total of about twenty-four hours. The flood assumed is one-third greater than the greatest flood on record; and a coincidence of such a flood with such a series of tides is so remote a possibility as to be hardly worthy of consideration, although, even should it occur, it appears evident that no serious damage would be done.

Sluice Gates and Gate Valves.

Much study was given to the design of sluice gates at the dam, and detail drawings were made for a wooden gate with metal fittings, and operating mechanism for hand or power operation. The question, also, of using an all-metal gate was considered, but no final conclusion had been reached at the end of the year.

The gate valves required for the pump-wells at the lock and sluices were contracted for.

Power required.

The various operations at the dam and lock, comprising drawbridge, lock gates, lock filling gates, warping machines, sluice gates, pumps at the lock and sluices, etc., require a considerable amount of power, which varies from a minimum rate of 0, when none of these operations are in progress, to a maximum rate of considerable amount when the various pumps are in operation. The power consumption is of such an intermittent character that it was early appreciated that it would be

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uneconomical to install and operate an independent power plant. Electric motors, with current obtained from outside parties, were decided upon as the best and most economical way to perform the various operations. Detailed estimates of the annual amount and the maximum rate of power consumption were made. Preliminary consideration was given to the location, type and size of the various motors required.

Temporary Bridge and Approaches.

It was decided the previous year to utilize as far as possible the freight bridge of the Boston & Maine Railroad, near Craigie bridge, as a temporary bridge, constructing a new bridge on the Boston side of the draw. The railroad company began in the fall a new bridge for its own use, as required by chapter 465 of the Acts of the Legislature for the year 1903. The existing bridge was carefully examined in the field, and studies made of the methods best suited for reenforcing and surfacing it for highway purposes.

As no provision had been made in the act above referred to for the construction of the temporary bridge, the actual work on its construction was necessarily delayed until the passage of an act authorizing such construction. This was done and approved by the Governor on Feb. 9, 1905.

Plans and specifications were drawn for the new portion on the Boston end, for the reconstruction of the old portion, and for the stone block pavement on the approaches. Designs were made for the drawbridge, piers and operating machinery.

In order that this work might be pushed as rapidly as possible, and proceed in harmony with the work under the main contract for the dam and lock, the contractor for which was in a position to begin the work without delay, it was arranged that the contractor for the dam and lock should do this work, so far as required, as extra work under its contract. The lumber, machinery, paving on the bridge, paving blocks and curb stones for the approaches, and some other materials, were provided for under other contracts.

Immediately on the passage of the act authorizing the construction of this bridge, work was begun on the new portion; and as soon as traffic was removed from that portion of the

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bridge in use by the Boston & Maine Railroad as a freight bridge, work was started there also.

As the act establishing the Charles River Basin Commission required that the draw in the new railroad bridge should be opposite the lock, and as the draw in the temporary bridge was only some 10 feet up stream from the new railroad draw, it was necessary that the draws in these two bridges should be in line with each other. This made an angle in the channel between the draw in the temporary bridge and the draw of the existing Craigie bridge of some 30 degrees. Six dolphins were driven on the westerly side of the channel near Craigie bridge, to assist navigation passing through the draws, and the lower end of the Craigie bridge draw pier was removed for a distance of some 100 feet, to allow long barges to change their direction from one draw channel to the other.

In strengthening the railroad bridge, 8 oak piles and 27 Norway pine piles were driven in places where the old piles were too much decayed to be repaired, and 74 piles were spliced with new 14-inch by 14-inch hard pine timbers from 6 to 8 feet in length, where the tops of the piles were partially decayed, but where the main portion of the piles below high-water mark was in good condition. Where the old stringers in the railroad bridge were in an unsatisfactory condition, new stringers were substituted for them or placed adjacent to them, and one line of new 14-inch by 14-inch stringers was placed on nearly the entire length of the bridge on the Cambridge side of the draw. The ties on the railroad bridge were generally from 1 inch to 4 or 5 inches apart, and where decayed or partially decayed, were either removed and new ties substituted, or turned one-half or one-fourth over, and the tops brought to an approximately level surface. Curb stringers were set on either side, and drift-bolted through the ties. Hard pine stringers were placed for supports for the rails of the street railway, and an underflooring for the bridge was laid, consisting of spruce plank from 1½ to 3 inches in thickness. Cast-iron scuppers, having a clear opening of 2 inches by 6 inches, were set in each gutter, from 18 to 20 feet apart.

The bridge was paved with wooden blocks, in the following manner: the flooring was covered with water-proofing, con-

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sisting of four thicknesses of roofing paper, mopped with hot pitch and then given a coat of pitch by flowing. A sand cushion of varying thickness, covering up the irregularities in the underflooring, was placed in position, and the wooden block pavement of long-leaf, yellow pine, 3 inches by 3 inches by 8 inches, treated by the creo-resinate process, with the top of the block grooved on one side to a depth of 1 inch, was laid on the sand cushion. After the blocks were placed and rolled, crushed stone screenings were swept into the grooves of the blocks, and then the pavement was grouted with 1 to 1 cement and sand.

A sidewalk 8 feet wide was built of 3-inch spruce plank on the down-stream side of the bridge, and on both sides of the bridge a 3-rail fence, 4 feet high, was constructed.

The approaches to the bridge were brought to the desired grade and paved with granite blocks, the average dimensions of which were 4 inches by 6 inches by 11 inches; the sidewalks were built of brick taken from the sidewalks of the old Craigie bridge, and the fences were made of 1-inch boards, 8 feet high.

The draw in the temporary bridge is 36 feet 3 inches wide, and is divided into two roadways, one (with a sidewalk) 25 feet wide and the other 20 feet wide. The draw consists of four leaves, two leaves being operated from each side of the draw by means of electric motors connected by gearing with a 4-inch shaft. During May the timbers for the draw sticks and Samson posts were in process of construction, and the gudgeon boxes, gudgeons and shafting were being set up. During June the leaves of the draw were lowered for the first time and the machinery was adjusted, the houses over the motors, controllers, etc., were built, and the gates were placed in position.

In connection with the draw, a pier 100 feet in length and 12 to 15 feet wide was built up stream on the Boston side of the draw, and two houses, each 16 by 12 feet, were built for the use of the drawtenders. Water was brought to the drawtenders' house from Leverett Street by a 1½-inch galvanized-iron pipe some 400 feet long.

The bridge was opened for travel Sunday morning, July 2, and has been operated uninterruptedly since that time.

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TEMPORARY BRIDGE — Reconstructing Old Portion of Bridge.

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With one exception, the drawtenders employed on the old Craigie bridge, under the Boston and Cambridge Bridge Commission, were transferred to the temporary bridge. Until August 31 the drawtenders worked twelve hours, but since then the length of the shift has been reduced to eight hours.

Boston Marginal Conduit.

The recording gages that had been installed during the previous year in sewer overflows leading from the combined sewers tributary to the Boston main drainage system and the Metropolitan sewer, as described in the report for the year ending Sept. 30, 1904, were maintained. The results obtained by these gages are given in Table No. 1: —

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TABLE NO. 1. — *Table showing Sewage Overflow into Charles River from Boston Shore for the Year ending Sept. 30, 1905, at Points indicated.*

MONTH.	ST. MARY STREET. TIDE GATES OPEN.				HEREFORD STREET. TIDE GATES OPEN.				DARTMOUTH STREET. TIDE GATES OPEN.			
	No. of Days of Overflow.	Total Hours.	Average Hours per Day of Overflow.	Per Cent. of Total Time.	No. of Days of Overflow.	Total Hours.	Average Hours per Day of Overflow.	Per Cent. of Total Time.	No. of Days of Overflow.	Total Hours.	Average Hours per Day of Overflow.	Per Cent. of Total Time.
October,	20	90.3	4.5	12.1	15	100.7	6.7	13.5	11	61.0	5.5	8.2
November,	2	7.8	3.9	1.1	19	68.9	3.6	9.6	10	32.5	3.3	4.5
December,	2	13.3	6.7	1.8	13	14.2	1.1	1.9	23	56.0	2.4	7.5
January,	7	32.5	4.6	4.4	19	100.6	5.3	13.5	19	53.5	2.8	7.2
February,	3	2.8	.9	.4	10	30.9	3.1	4.6	9	18.5	2.1	2.8
March,	22	88.3	4.0	11.9	11	49.7	4.5	6.7	2	5.8	2.9	.8
April,	13	82.8	6.4	11.5	8	39.7	5.0	5.5	3	7.5	2.5	1.0
May,	2	5.2	2.6	.7	9	22.2	2.5	3.0	2	7.5	3.8	1.0
June,	7	17.3	2.5	2.4	20	81.2	4.1	11.3	10	25.0	2.5	3.5
July,	3	4.2	1.4	.6	18	36.2	2.0	4.9	4	6.0	1.5	.8
August,	2	4.0	2.0	.5	22	45.0	2.0	6.0	3	5.0	1.7	.7
September,	2	22.3	11.2	3.1	18	52.5	2.9	7.3	2	15.2	7.6	2.1
Totals,	85	370.8	4.4	4.2	182	641.8	3.5	7.3	98	293.5	3.0	3.4

TABLE NO. 1. — *Table showing Sewage Overflow into Charles River from Boston Shore for the Year ending Sept. 30, 1905, at Points indicated* — Concluded.

MONTH.	BERKELEY STREET. TIDE GATES OPEN.				BRIMMER STREET. TIDE GATES OPEN.			
	No. of Days of Overflow.	Total Hours.	Average Hours per Day of Overflow.	Per Cent. of Total Time.	No. of Days of Overflow.	Total Hours.	Average Hours per Day of Overflow.	Per Cent. of Total Time.
October,	11	42.6	3.9	5.7	31	243.1	7.8	32.7
November,	10	34.5	3.5	4.8	30	259.2	8.6	36.0
December,	13	41.4	3.2	5.6	20	140.3	7.0	18.9
January,	11	40.0	3.6	5.4	15	40.7	2.7	5.5
February,	8	11.1	1.4	1.7	9	40.0	4.4	6.0
March,	9	37.6	4.2	5.0	3	12.2	4.1	1.6
April,	5	22.0	4.4	3.1	12	82.5	6.9	11.5
May,	6	13.5	2.3	1.8	31	286.5	9.2	38.5
June,	14	52.2	3.7	7.3	30	275.5	9.2	38.3
July,	15	35.6	2.4	4.8	31	238.0	7.7	32.0
August,	19	41.3	2.2	5.6	31	233.5	8.2	34.1
September,	25	116.0	4.6	16.1	30	226.3	7.5	31.4
Totals,	146	487.8	3.3	5.6	273	2,097.8	7.7	24.0

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The Brimmer Street gage showed a continuous overflow at low tide during October and November, and from April until the end of the year, due partly to the deposit of sand and gravel in the bottom of the sewer, and partly, as was reported after the end of the year, to a partially open blow-off valve from a water main.

A decision was reached early in the year, as the result of extended studies which were made the previous year, with the understanding that the city of Boston would proceed with the separation of sewage from storm water on the areas tributary to the Charles River, fixing the size of the Boston marginal conduit, above the connection with the basin at the upper end of the lock, with an interior area of cross-section of 41.3 square feet, the bottom of the inside masonry to be 1½ feet below Boston base, or some 2.1 feet below mean low tide.

Various designs for overflows from the conduit into the basin were considered, and a final decision adopted. Much study was given to the economical design of the masonry section, and extended studies were made of the rainfall, run-off, etc., of sewers tributary to this conduit from the dam to the Fens.

Contract plans were drawn for the section of the Boston marginal conduit extending from the dam to the southerly side of Cambridge Street, located almost entirely in the Charles-bank. In connection with this work 13 borings were taken, to depths of from 20 to 48 feet, with a total depth of 530.4 feet.

A contract was made for the portion of the conduit between the dam and the southerly side of Cambridge Street. This conduit is of concrete, having for inside dimensions a height of 7 feet 8¼ inches, and a width of 6 feet 4 inches. The first 422 feet in length are built on a gravel and clay bottom, without piles. The remainder of the conduit, so far as constructed at the end of the year, is on piles. A 10-inch underdrain has been laid about a foot below the invert. One-half-inch twisted steel rods, turned up at the ends for about a foot, laid some 4½ inches above the bottom, and ¾-inch rods laid 3 inches below the top, have been built in the concrete of the invert, both rods usually being spaced 12 inches on centers. The piles used are spruce, 10 inches in diameter at the butt and 6 inches at the tip, and were driven 2 feet apart on centers under the side walls, and 4 feet apart under the center of the conduit.

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The driving of piles during the day interfered so much with the use of a cableway for excavating and backfilling that the contractor was permitted to drive piles at night, all piles being driven in that way since August 31, except on Saturday afternoons. Delays occasioned by old sea-walls, bulkheads and other obstructions, and the large quantity of water to be taken care of, caused the work to progress more slowly than required by the contract. A brick bulkhead, 12 inches thick, was built at the lower end of the conduit on September 1, and the outside face covered with a coat of cement plaster, to keep out the water. In places where the conduit passed through old sea-walls and rock fills, voids were left back of the sheeting. These voids were filled as quickly as possible, either with sand or a cement grout.

At the request of the officials of the park department of the city of Boston, the construction of that portion of the conduit through the Women's Gymnasium at the southerly end of the Charlesbank was put off until as late in the fall as possible, in order to not interfere with the use of this portion of the park during the summer months, when the schools are closed. In order, however, to complete the work at Cambridge Street before traffic should be diverted to the new Cambridge bridge, the contractor started a force on that end of the work September 20. Unexpected difficulties were encountered at this point. The excavation was partially through an old rock fill, which allowed tide water from the river to enter the trench freely. Trouble was also experienced with the pumps.

The conduit was built largely under the sidewalk next Charles Street, from Poplar Street to Fruit Street. The park department of the city of Boston planned to relocate the sidewalk, after the construction of the conduit, by moving it nearer to the street; and, as the conduit would then come in the park area, the department desired to have the conduit trench surfaced with loam to a depth of 18 inches. It was agreed that the Charles River Basin Commission should furnish 12 inches of this loam, and would not be required to replace the previously existing brick sidewalk. An agreement was therefore made with the contractor for furnishing the loam, as extra work under the contract.

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Dredging in the Basin.

Preliminary studies were made for dredging channels of various widths and depths at the upper end of the basin, and for disposing of the material in filling the shallow arms and pools adjacent to the river. This work is necessary in order to provide a sufficient depth of water at the upper end of the basin to render it attractive and to permit its use for pleasure purposes. It will also assist in the destruction of malarial mosquitoes by destroying their breeding places. Further surveys will be required before reaching definite conclusions.

Soundings were made in the lower basin, where dredging is necessary to give the required depth of water for navigation purposes.

Broad and Lechmere Canals.

Soundings were made in Broad Canal for a length of 3,475 feet, the width of the canal varying from 75 to 125 feet; and in Lechmere Canal for a length of 2,043 feet, the canal varying in width from 100 to 127 feet. These soundings were taken not more than 10 feet apart, on cross-section lines 25 feet apart.

Land Takings.

A taking plan was made of the land of George O. Proctor at the westerly end of the dam. This property is bounded by Commercial Avenue, Bridge Street, the river and Lechmere Canal.

A taking plan was also made of property claimed by the heirs of Caroline M. McGlenen near the Boston end of Craigie bridge.

Summary of Borings.

The following is a summary of the borings made in the basin and the canals and for the Boston marginal conduit: —

	Number.	Total Depth (Feet).
Made during the year,	13	530.4
Made previous to Oct. 1, 1904,	150	4,535.3
Total,	163	5,065.7



BOSTON MARGINAL CONDUIT — Driving Piles.

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Summary of Soundings.

The work of taking soundings, which had been started only a week previous to the end of the time covered by the last annual report, was continued during the fall as long as the weather permitted, and was resumed in the early spring. The area covered by the soundings amounted to 45.34 acres, which, added to the area sounded during the previous year, makes a total of 47.84 acres. The method of making these soundings was described in the report of the chief engineer for the year ending Sept. 30, 1904.

Upland Flow of the Charles River.

Careful studies of upland flows and the discharge of the Charles River at the dam were made.

A recording gage, showing the depth of water flowing over the dam at the Waltham Bleachery, was maintained, and weekly current meter observations were taken of the flow in the canal past the Bleachery dam. Although one heavy rainfall was recorded on September 3 and 4, amounting to some 4½ inches, it did not increase very materially the flow on the lower portion of the river, and neither the maximum nor the minimum flow of this year approaches the record of the previous year.

Table No. 2 shows the estimated average flow of the Charles River at Waltham for weekly periods during the year ending Sept. 30, 1905. The area of the watershed above "The Bleachery" is taken to be 169 square miles; this excludes 70 square miles assumed to be tributary to Mother Brook and 24 square miles tributary to the Cambridge reservoirs. Whenever these reservoirs overflowed into the Charles, the amount, as furnished by Mr. L. M. Hastings, city engineer of Cambridge, has been deducted from the total discharge measured at "The Bleachery."

Table No. 3 shows the number of days during the year ending Sept. 30, 1905, when the upland flow of the Charles River at Craigie bridge, estimated from the records kept by the Charles River Basin Commission at the Waltham Bleachery, was more than 500 cubic feet per second for twenty-four hours.

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Table No. 4 shows the length of time during which a normal tide will be higher than the water in the basin, and the rise of the basin during that interval for various rates of upland flow.

Diagram No. 3 shows the daily flow of the Charles River at "The Bleachery," Waltham, in connection with the rainfall at Chestnut Hill, taken from the records of the Metropolitan Water Works.

TABLE No. 2. — *Estimated Weekly Average Flow of Charles River at the Waltham Bleachery for the Year ending Sept. 30, 1905.*

WEEK ENDING —	Cubic Feet per Second.	Cubic Feet per Second per Square Mile.[1]	WEEK ENDING —	Cubic Feet per Second.	Cubic Feet per Second per Square Mile.[1]
1904.			**1905.**		
Oct. 8, . . .	67	.40	Apr. 8, . . .	577	3.41
15, . . .	56	.33	15, . . .	585	3.46
22, . . .	68	.40	22, . . .	426	2.52
29, . . .	104	.62	29, . . .	315	1.86
Nov. 5, . . .	62	.37	May 6, . . .	223	1.32
12, . . .	70	.41	13, . . .	151	.89
19, . . .	98	.58	20, . . .	110	.65
26, . . .	112	.66	27, . . .	162	.96
Dec. 3, . . .	91	.54	June 3, . . .	78	.46
10, . . .	84	.50	10, . . .	97	.57
17, . . .	66	.39	17, . . .	98	.58
24, . . .	57	.34	24, . . .	139	.82
31, . . .	66	.39	July 1, . . .	192	1.14
1905.			8, . . .	137	.81
Jan. 7, . . .	176	1.04	15, . . .	61	.36
14, . . .	525	3.11	22, . . .	40	.24
21, . . .	392	2.32	29, . . .	37	.22
28, . . .	240	1.42	Aug. 5, . . .	53	.31
Feb. 4, . . .	125	.74	12, . . .	53	.31
11, . . .	145	.86	19, . . .	46	.27
18, . . .	117	.69	26, . . .	53	.31
25, . . .	128	.76	Sept. 2, . . .	49	.29
Mar. 4, . . .	121	.72	9, . . .	207	1.22
11, . . .	174	1.03	16, . . .	292	1.73
18, . . .	474	2.81	23, . . .	188	1.11
25, . . .	565	3.34	30, . . .	113	.67
Apr. 1, . . .	655	3.88			

[1] Area of watershed is 169 square miles.

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TABLE No. 3. — *Number of Days during Year ending Sept. 30, 1905, when Estimated Upland Flow of Charles River at Craigie Bridge was More than 500 Cubic Feet per Second for Twenty-four Hours, from Records kept by the Charles River Basin Commission at "The Bleachery," Waltham.*

MONTH.	500-750 Cubic Feet per Second (Days).	750-1,000 Cubic Feet per Second (Days).	1,000-1,500 Cubic Feet per Second (Days).	1,500-2,000 Cubic Feet per Second (Days).	2,000-2,500 Cubic Feet per Second (Days).	Total Number of Days exceeding 500 Cubic Feet per Second.	Rainfall at Chestnut Hill (Inches).	Average Rainfall on Sudbury Watershed for Thirty Years (Inches).
1904.								
October,	–	–	–	–	–	–	2.21	4.23
November,	–	–	–	–	–	–	1.81	3.96
December,	–	–	–	–	–	–	2.81	3.81
1905.								
January,	7	3	–	–	–	10	5.49	4.21
February,	–	–	–	–	–	–	2.27	4.34
March,	7	8	5	–	–	20	3.34	4.59
April,	7	14	–	–	–	21	3.08	3.61
May,	–	–	–	–	–	–	1.65	3.34
June,	–	–	–	–	–	–	5.38	3.09
July,	–	–	–	–	–	–	1.55	3.67
August,	–	–	–	–	–	–	3.58	4.05
September,	–	–	–	–	–	–	5.93	3.32
Totals,	21	25	5	–	–	51	39.10	46.22
1903-04,	29	18	13	5	1	66	45.98	–

TABLE No. 4. — *Time during which a Normal Tide will be Above the Water in the Basin, and Rise of Basin during that Interval for Various Rates of Upland Flow.*

Rate of Upland Flow (Cubic Feet per Second).	Time Harbor will be Above Basin.		Rise of Basin (Feet).	Rate of Upland Flow (Cubic Feet per Second).	Time Harbor will be Above Basin.		Rise of Basin (Feet).
	Hrs.	Min.			Hrs.	Min.	
500	3	48	.20	3,000	3	19	1.02
1,000	3	42	.39	4,000	3	8	1.28
1,500	3	36	.56	5,000	2	58	1.51
2,000	3	30	.72	6,000	2	49	1.71
2,500	3	25	.87				

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Traffic through Draw of Craigie Bridge and of Temporary Bridge.

A record was kept of the traffic through the draw of Craigie bridge until the temporary bridge was completed, when the records were transferred to the latter bridge. This record gives the tonnage, draft and time of passage of vessels of different kinds. Some of the results of the records obtained are shown by the following diagrams: —

Diagram No. 4 shows weekly totals of cargoes, in tons, not including the material furnished for the Charles River dam, passing Craigie bridge and the temporary bridge for the year ending Sept. 30, 1905.

Diagram No. 5 shows the monthly totals of cargoes, in tons, not including the material furnished for the Charles River dam, passing Craigie bridge since Sept. 30, 1899. Except for a slight increase during the current year, this diagram indicates quite a regular decrease in the amount of tonnage each year for the last six years, with the exception of the year 1900–01, when the construction of the foundations for the piers of the new Cambridge bridge caused a large increase in the traffic.

Diagram No. 6 shows the yearly number of vessels passing Craigie bridge since Sept. 30, 1885, and the number of times the draw has been opened per year since Sept. 30, 1871, the only complete years covered by existing records.

The winter of 1904–05 was severe, ice forming in the river before Christmas and continuing until the latter part of February.

Miscellaneous Engineering Work.

Eighty finished plans were prepared during the year, besides numerous studies and designs. A number of working drawings for the dam and lock, also, were in a partially completed condition at the end of the year. One hundred and seventy-three plans were indexed and filed, which, with previous plans, make a total of 435.

One hundred and twelve photographs were taken by Mr. Luther H. Shattuck.

Storage Shed.

A storage shed, 64 feet long by 29 feet wide, was built at the corner of Charles and Leverett streets, to take care of the

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twisted steel rods which are to be used in the bottom of the lock and of the Boston marginal conduit. On one side of this is a lime box, some 33 feet long by 6 feet wide by 18 inches deep, in which the rods are kept in air-slacked lime, after being bent. For use in connection with these rods a hydraulic bending machine was installed in the shed. This bending machine consists of a hydraulic jack, with a cylinder some 6 inches in diameter, to each end of which is connected a 1-inch pipe controlled by 3-way cocks each side of the delivery pipe from the force pump. A pressure of 900 pounds per square inch has been obtained from this machine, and it requires less than 600 pounds pressure to bend a rod 1⅛ inches in diameter. A Watson-Stillman hydraulic shear was also installed in the storage shed, and is used to cut the twisted steel rods into the required lengths.

Contracts

Nineteen contracts were let during the year. The preparation of the various contract plans and specifications, estimates, supervision of the work, etc., occupied a considerable portion of the time of the engineering force. A detailed statement of the contracts made during the year is given in Appendix B.

Following are additional descriptions of some of these contracts, except so far as the work done under them has already been described under the headings of "Dam and Lock," "Temporary Bridge and Approaches," and "Boston Marginal Conduit."

Contract No. 1, Holbrook, Cabot & Rollins Corporation. — Dam and Lock in the Charles River, Boston and Cambridge.

On Jan. 14, 1905, a contract was made with the Holbrook, Cabot & Rollins Corporation for the construction of the dam and lock. The amount of this contract, on the basis of award, is $801,607.50.

The contract provides for the following work: —

The main portion of the dam is to be constructed of earth filling between masonry retaining walls, supported on pile foundations. Within the coffer-dam to be built at the Boston end are to be constructed the lock, a portion of the Boston marginal conduit, with gate-chambers, connections to the basin

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and other structures. Within the coffer-dam to be built at the Cambridge end are to be constructed a portion of the Cambridge marginal conduit, and sluices for the purpose of discharging the flow of the river through the dam, the central one of which, with its top at a higher level than the others, will serve also as a lock for small boats. The sluice next the Cambridge side will be connected with the marginal conduit. Gate-chambers and other structures will be connected with the masonry of the sluices. The structures within the coffer-dams will be mainly of concrete masonry on pile foundations. From the lock to the sluices on the Cambridge side there is to be constructed a so-called shut-off dam, for the purpose of arresting the tidal flow. Excavations by dredging will be required in the Broad and Lechmere canals, in the basin and in the vicinity of the outlets of the sluices and marginal conduits. Excavation at the dam and lock, by dredging and other methods, will be required at the sites of the retaining walls and shut-off dam, and from the area enclosed by the coffer-dams. The material to be obtained from the above excavation will be used at the dam unless the contractor is required to deposit some of the material between the Cambridge bridge and Fairfield Street, on the Boston side of the basin, or in the basin below the Cambridge bridge. The earth from the above excavation not being sufficient to complete the earth portion of the dam, additional filling is to be obtained from other sources. Coarse gravel and riprap will be required at the shut-off dam and at the ends of the lock and sluices. The Leverett Street, Chambers Street and Bridge Street sewers are to be connected with the marginal conduits.

The following table gives a summary of the principal quantities and prices: —

Items.	Quantities.	Maximum Prices.	Minimum Prices.
Coffer-dam at the Boston end,	-	$70,000 00	$70,000 00
Coffer-dam at the Cambridge end,	-	27,000 00	27,000 00
Earth excavation,	730,000 cu. yds.	45	34
Coarse gravel,	7,000 cu. yds.	75	75

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Items.	Quantities.	Maximum Prices.	Minimum Prices.
Broken stone or screened gravel,	5,700 cu. yds.	$1 50	$1 50
Riprap,	9,700 cu. yds.	1 50	1 50
Round piles in place,	468,500 lin. ft.	30	14
Spruce lumber in place,	540 M. ft. B. M.	50 00	35 00
Concrete masonry,	41,000 cu. yds.	6 50	4 50
Granolithic surfacing,	1,800 sq. yds.	1 00	1 00
Ashlar masonry,	2,710 cu. yds.	20 25	18 00
Face dressing,	20,000 sq. ft.	80	50
Iron and other metal work to be placed,	500 tons	25 00	25 00
Furnishing and laying vitrified pipe,	5,000 lin. ft.	60	15

During the months of January and February the contractor was gradually accumulating the plant to be used in the work, consisting of engines, boilers, derricks, pumps, etc., and work was started on the main contract March 1, by removing the iron fence along the sea-wall at the northeasterly end of the Charlesbank. Piles were driven for the foundation of a storage bin for sand and gravel to be used for the concrete, and some of the posts and framing were set in place.

The first sheeting for the coffer-dam on the Boston side was driven on March 21. At 7 A.M., on July 5, the work of tearing down the old Craigie bridge was started. The dredging for the foundation for the lock was begun on April 27. The timber portion of the coffer-dam on the Boston side was completed on September 29.

The first piles in the temporary bridge were driven on March 2. The Boston & Maine Railroad began sending trains over its new bridge on March 27. The work of removing piles in the old Boston & Maine drawbridge was begun on March 31.

The total value of the work performed, as shown by the September estimate, was $119,917.79, the principal items of which were as follows: —

Coffer-dam at the Boston end,	46 per cent. completed.
Coffer-dam at the Cambridge end,	4.5 per cent. completed.
Earth excavation,	113,115 cu. yds.
Round piles in place (exclusive of coffer-dams),	18,170 lin. ft.

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Contract No. 2, United States Wood Preserving Company.— Wooden Block Paving for Temporary Bridge, Boston and Cambridge.

On March 23, 1905, a contract was made with the United States Wood Preserving Company for furnishing and laying the wooden block paving for the temporary bridge. The amount of this contract, on the basis of award, is $11,700.

The contract called for paving the temporary bridge with creo-resinate wood block pavement, with a maintenance guarantee for four years.

The wood blocks were received and the unloading of a vessel was started on May 8, and completed May 11. Laying tar paper for the waterproofing was started May 27, and the first of the wood blocks were laid on June 2. The laying of the wood blocks was completed on Sunday, June 18. The regular traffic was not turned over the bridge until July 2.

Owing to the unsatisfactory condition of the roadway, the amount allowed on this contract at the end of the year was $4,782.52.

Contract No. 3, James Driscoll & Son. — Section 2 of the Boston Marginal Conduit, Boston.

On June 13, 1905, a contract was made with James Driscoll & Son for the construction of the Boston marginal conduit, between the dam and the southerly side of Cambridge Street. The amount of this contract, on the basis of award, is $50,600.

The contract calls for the construction of the main conduit and of an overflow conduit extending from the main conduit to the Charlesbank wall, a short distance north of Cambridge Street. The contract provides for piles where necessary, for reenforcing the concrete with steel rods furnished by the Commission, and for the temporary crossings of the overflows from the sewers at Fruit Street and Cambridge Street. The principal items of the preliminary estimate were: —

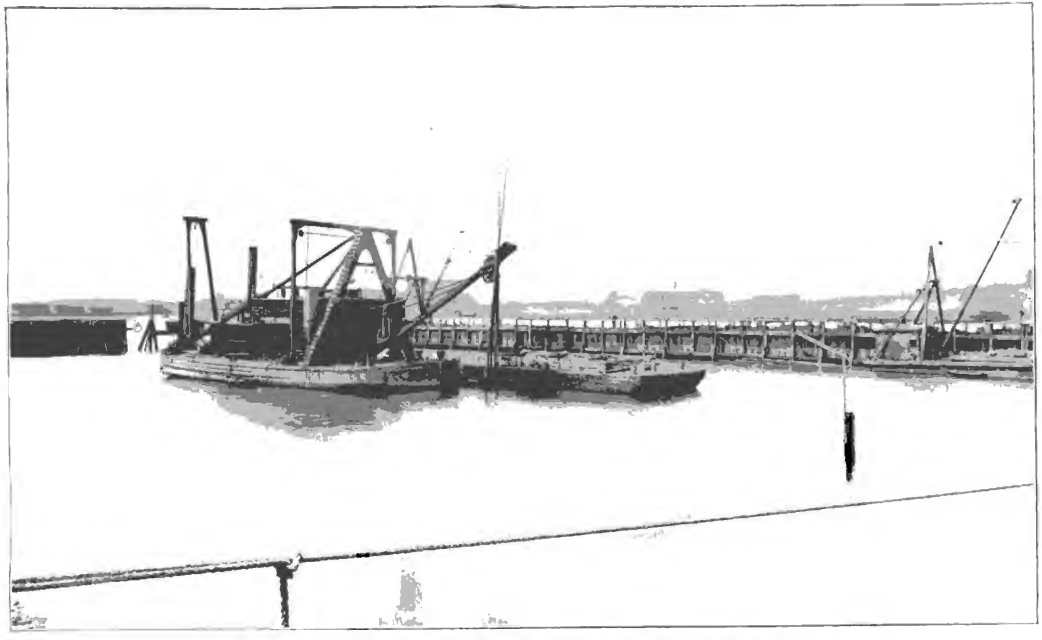
Earth excavation and refill (main conduit),	1,800 lin. ft.
Earth excavation and refill (overflow conduit),	175 lin. ft.
Piles,	62,000 lin. ft.
Underdrain,	2,000 lin. ft.

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DAM AND LOCK — Guide Piles for Coffer-dam at Lock.

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DAM AND LOCK — Westerly Side of Coffer-dam and Dredging at Lock.

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DAM AND LOCK — Coffer-dam, Boiler and Storage Bin at Lock.

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DAM AND LOCK — Removing Craigie Bridge.

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Concrete masonry,	2,700 cu. yds.
Placing iron and other metal work,	45 tons.
Sheeting left in place,	70 M. ft. B. M.

Work was started under this contract on June 21. A stiff-leg derrick was delivered on June 23, and on June 26 excavation for a pump-well began. A Carson-Lidgerwood cableway, about 300 feet long between towers, was put in operation July 8, and continued on the work until the end of the year. The first section of the concrete invert was laid July 11, three weeks after starting work. A Smith concrete mixer was delivered and put in operation July 26. Lehigh and Whitehall cements have been used for the concrete. Pile-driving was begun August 12.

The total value of the work performed, as shown by the September estimate, was $15,261.69, the principal items of which were as follows: —

Earth excavation and refill (main conduit),	668.9 lin. ft.
Piles,	6,928.8 lin. ft.
Underdrain,	672.0 lin. ft.
Concrete masonry,	818.1 cu. yds.
Placing iron and other metal work,	8.0 tons.
Sheeting left in place,	19.0 M. ft. B. M.

Contract No. 4, Camden Iron Works. — Cast-iron Pipes and Special Castings, Boston and Cambridge.

On July 18, 1905, a contract was made with the Camden Iron Works for a portion of the cast-iron pipes and special castings to be embedded in and attached to the masonry in connection with the dam and lock and the Boston marginal conduit. The amount of the contract, on the basis of award, is $5,640.75.

The contract includes the cast-iron pipes and special castings for suction pipes and discharge pipes leading to pump-wells at the lock and sluices, the conduit under the lock, outlets from marginal conduits and overflows, and other purposes. The engineer's estimate of quantities is as follows: —

Straight pipe, of sizes varying from 6-inch to 60-inch,	110.0 tons.
Standard special castings,	15.1 tons.
Special castings,	22.2 tons.

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Considerable progress had been made on this contract prior to the end of the year, but no pipe had been received or payments made thereon.

Contract No. 5, Henry R. Worthington. — Furnishing and erecting Pumps, Boston and Cambridge.

On Sept. 30, 1905, a contract was made with Henry R. Worthington for furnishing and erecting pumps, the amount of the contract being $9,533.

The contract calls for furnishing and erecting three pumps, with motors, suction pipes, foot valves, controllers and appurtenances, for the purpose of emptying the lock, lock gate recesses, and sluices at the dam, one pump having a capacity of 13,000 gallons per minute, another 5,000 gallons per minute, and the third 1,200 gallons per minute. The contract also provides that the contractor shall keep the pumps in repair for two years after they are erected and tested.

Contract No. 6, Gibby Foundry Company. — Furnishing Castings and Other Metal, Boston and Cambridge.

On July 27, 1905, a contract was made with the Gibby Foundry Company for castings and other metal required in connection with the dam and lock and the Boston marginal conduit. The amount of the contract, on the basis of award, is $6,013.74.

This contract covers the greater part of the special castings required at the lock and the lower portion of the Boston marginal conduit. The principal items of the preliminary estimate were : —

Unfinished iron castings,	27,320 pounds.
Finished iron castings,	82,350 pounds.
Finished steel castings,	5,260 pounds.
Rods, bolts, etc.,	5,270 pounds.

At the end of the year some 3 per cent. of the total value of the contract had been delivered at the dam, but no payments had been made to the contractor.

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BOSTON MARGINAL CONDUIT — Foundation Piles.

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BOSTON MARGINAL CONDUIT — View at Fruit Street showing Cableway and Pile-driver.

Operating Machinery for Temporary Draw.

In addition to the contracts enumerated in Appendix B, Mr. H. J. Shaw erected the machinery of the temporary draw, under an arrangement by which he furnished the machine labor at $0.50 per hour, blacksmith labor (including blacksmith and helper) at $0.80 per hour, and the cast iron at $0.005 per pound, in addition to his cost price. The other machinery, trunnions and weights for operating the draw, so far as furnished by him, were at cost. The amount paid Mr. Shaw under this arrangement was $3,785.13.

Respectfully submitted,

HIRAM A. MILLER,
Chief Engineer.

Boston, Dec. 26, 1905.

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APPENDIX.

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Appendix A.

Chapter 465 of the Acts of 1903, as amended by Chapter 65 of the Acts of 1905.

An Act to authorize the Construction of a Dam across the Charles River between the Cities of Boston and Cambridge.

Be it enacted, etc., as follows:

Charles river basin commission, appointment, term, etc.

Section 1. The governor of the Commonwealth, with the advice and consent of the council, shall appoint three commissioners, residents of the metropolitan parks district, who shall constitute the Charles river basin commission, hereinafter called the commission, and who shall be sworn before entering upon the duties of their office. One commissioner shall be designated by the governor as chairman, and two commissioners shall constitute a quorum. The term of office shall be three years, and all vacancies shall be filled by the governor, with the advice and consent of the council. Any commissioner may be removed by the governor, with the advice and consent of the council, for such cause as he shall deem sufficient and shall assign in the order of removal. Each commissioner shall receive an annual salary of such amount as the governor and council shall determine.

Compensation.

Powers and duties.

Section 2. The commission may appoint a secretary, engineers and assistants, shall keep accurate accounts of its expenditures, and shall make an annual report of its doings, including an abstract of its accounts, to the governor and council. The commission whenever the Commonwealth has been authorized by the United States to build a dam and lock under the provisions of this act, shall proceed to do the work herein required of it, and shall in the meantime make examinations and plans therefor.

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Dam to be constructed across Charles river, etc.

SECTION 3. The commission shall construct across Charles river between the cities of Boston and Cambridge, a dam, at least sufficiently high to hold back all tides and to maintain in the basin above the dam a substantially permanent water level not less than eight feet above Boston base. The dam shall occupy substantially the site of the present Craigie bridge, which shall be removed by the commission. *The commission may construct or otherwise provide a temporary highway bridge and approaches thereto for the use of teams and pedestrians during the construction of the dam.* The dam shall be not less than one hundred feet in width at said water level and a part thereof shall be a highway and the remainder shall be a highway, or a park or parkway, as the commission shall determine. The dam shall be furnished with a lock not less than three hundred and fifty feet in length between the gates, forty feet in width and thirteen feet in depth below Boston base, and shall be built with a suitable drawbridge or drawbridges, wasteways and other appliances. The part of the dam used as a highway shall be maintained and operated in the same manner as the Cambridge bridge, and under the laws now or hereafter in force relating to said bridge.

Navigable channels to be dredged.

SECTION 4. The commission shall dredge navigable channels in the basin from the lock to the wharves between the dam and Cambridge bridge, to Broad canal and to Lechmere canal, the channel to be not less than one hundred feet in width and eighteen feet in depth; shall dredge Broad canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to the Third Street draw, not less than thirteen feet of water from the Third Street draw to the Sixth Street draw, and not less than eleven feet of water from the Sixth Street draw to the railroad draw, and not less than nine feet of water for one hundred and twenty-five feet above the railroad draw; shall dredge Lechmere canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to and including Sawyer's lumber wharf,

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and not less than thirteen feet of water from said wharf up to the head of the canal at Bent street; all depths aforesaid to be measured from the water level to be maintained in the basin.

Manner of dredging, etc.

The commission shall do all such dredging and all strengthening of the walls of the canals and of the basin where dredging is done by the driving of prime oak piles two feet on centres along the front of said wharves or walls, and all removing and relocating of pipes and conduits made necessary by such dredging, so that vessels requiring a depth of water not exceeding the respective depths above prescribed can lie alongside of, and in contact with, the wharves; and this work shall be done in such manner as to cause the least possible inconvenience to abutters, and shall be finished on or before the completion of the dam; and after the walls or wharves have been so strengthened, all repairs on or rebuilding of the walls and wharves shall be done by the abutters.

Certain other dredging to be done, etc.

The commission shall do such dredging in the basin outside of the channels aforesaid as may be necessary for the removal of sewage, sludge or any offensive deposit; shall do such other dredging as it shall deem proper, and shall take all proper measures for the destruction of malarial mosquitoes in the basin and its vicinity.

Marginal conduits to be constructed, etc.

SECTION 5. The commission, before the completion of the dam, shall construct marginal conduits on the north side of the basin from the outlet of the overflow channel in Binney street to a point below the dam, and on the south side of the basin from the present outlet of the Back Bay Fens to a point below the dam, and may construct an extension thereof toward, or to, St. Mary street, the conduits to be used to receive and conduct below the dam the overflow from sewers and the surface drainage and other refuse matter which would otherwise pass into the basin.

Certain lands, etc., may be taken, etc.

SECTION 6. The commission, for the purpose of carrying out the provisions of the preceding sections, may from time to time take in fee or otherwise, by

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purchase or otherwise, for the Commonwealth, or the city of Boston or the city of Cambridge, as the commission shall determine, lands, flats and lands covered by tide-water on Charles river, by filing in the registry of deeds for the county and district in which the lands or flats are situated a description thereof, sufficiently accurate for identification, signed by a majority of the commissioners; and any person whose property is so taken may have compensation therefor as determined by agreement with the commission, and if they cannot agree the compensation may be determined by a jury in the superior court for the county where the property is situated under the same provisions of law, so far as they are applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the commission, or by such person, filed in the clerk's office of said court against the Commonwealth or the city for which the lands or flats are taken within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

The metropolitan park commission to have exclusive control of dam, etc.

SECTION 7. The metropolitan park commission, when the work provided for in the preceding sections is finished, shall, subject to the powers vested by law in the state board of health, have exclusive control of the dam and lock and of the basin and river between the dam and the city of Waltham, as a part of the metropolitan parks system, and of all poles, wires and other structures placed or to be placed on, across, over or in any part of said basin, dam or lock, and of the placing thereof, except the part of the dam used as a highway and the bridges and other structures erected by any city or town within its limits and upon its own lands; may make reasonable rules and regulations, not impairing freight traffic, for the care, maintenance, protection and policing of the basin; and throughout the year shall operate the lock without charge, maintain the lock, channels and canals aforesaid at the depths aforesaid, and clear of obstructions caused by

May make rules and regulations, etc.

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natural shoaling or incident to the building of the dam, and maintain the water in the basin at such level and the lock, channels and canals sufficiently clear of obstructions by ice so that any vessel ready to pass through the lock, and requiring no more depth of water than aforesaid, can pass through to the wharves aforesaid. In the event of an emergency, requiring the temporary reduction of such level, notice thereof shall be given to the occupants of said wharves, and such reduction shall not be lower nor continue longer than the emergency requires. Said metropolitan park commission may order the removal of all direct sewage or factory waste as a common nuisance from the river and its tributaries below the city of Waltham; and no sewer, drain, overflow or other outlet for factory or house drainage shall hereafter be connected with the basin below said city without the approval of the metropolitan park commission.

Notice to be given in case of emergency requiring temporary reduction of level, etc.

Removal of direct sewage or factory waste may be ordered, etc.

SECTION 8. The Commonwealth shall in the first instance pay all expenses incurred in carrying out the provisions of the preceding sections, and the same shall, except as provided in the following section, constitute part of the cost of construction and maintenance of the metropolitan parks system; and in addition to the amounts heretofore authorized for such construction the treasurer and receiver-general shall, from time to time, as authorized by the governor and council, issue notes, bonds or scrip, in the name and behalf of the Commonwealth, entitled Charles River Basin Loan, to the amount which the commission may deem necessary for the expenses incurred under the first six sections of this act; and all acts and parts of acts relative to loans for such construction and providing for their payment shall, so far as they may be applicable and not inconsistent herewith, apply to such notes, bonds and scrip and to their payment.

Payment of expenses.

Charles River Basin Loan.

SECTION 9. The commissioners next appointed under the provisions of chapter four hundred and nineteen of the acts of the year eighteen hundred and ninety-

Apportionment of expenses, etc.

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nine, and amendments thereof, in apportioning the expenses of maintaining the metropolitan parks system shall include as part thereof the expense of maintenance incurred under the preceding sections of this act; shall also determine, as they shall deem just and equitable, what portion of the total amount expended for construction under sections three, four, five and six of this act shall be apportioned to the cities of Boston and Cambridge as the cost of the removal of Craigie bridge and the construction of a suitable bridge in place thereof, and the remainder shall be considered and treated as part of the cost of construction of the metropolitan park system. The treasurer and receiver-general shall determine the payments to be made each year by said cities, one half by each, to meet the interest and sinking fund requirements for the amounts apportioned to them as the cost of such bridge, and the same shall be paid by each city into the treasury of the Commonwealth as part of its state tax.

City of Boston to do certain dredging, construct conduits, sewer, etc.

SECTION 10. The city of Boston, by such officer or officers as the mayor may designate, shall forthwith after the passage of this act, do such dredging in the Back Bay Fens as the board of health of said city may require, shall construct a conduit between Huntington avenue and Charles river, to form an outlet into Charles river for the commissioners' channel of Stony brook, shall reconstruct the present connections between the river and the Fens so as to allow free access of water from the river into the streams and ponds in the Fens and thence into the river, and shall construct a sewer in the rear of the houses on the north side of Beacon street between Otter and Hereford streets. Such officer or officers may construct a conduit between Green street and Forest Hills and may construct or rebuild within five years one or more conduits for Stony brook between the westerly side of Elmwood street and the Fens: *provided, however*, that the expense of such conduits between Green street and Forest Hills and between Elmwood street and the Fens shall be paid for

Proviso.

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out of the annual appropriation for sewer construction under the provisions of chapter four hundred and twenty-six of the acts of the year eighteen hundred and ninety-seven and acts in amendment thereof or in addition thereto.

Wall or embankment may be built on Boston side of Charles river.

SECTION 11. The board of park commissioners of Boston may, with the approval of the mayor, build a wall or embankment on the Boston side of Charles river beginning at a point in the southwest corner of the stone wall of the Charlesbank, thence running southerly by a straight or curved line to a point in Charles river not more than three hundred feet distant westerly from the harbor commissioners' line, measuring on a line perpendicular to the said commissioners' line at its intersection with the southerly line of Mount Vernon street, but in no place more than three hundred feet westerly from said commissioners' line; thence continuing southerly and westerly by a curved line to a point one hundred feet or less from the wall in the rear of Beacon street; thence by a line substantially parallel with said wall to the easterly line of the Back Bay Fens, extended to intersect said parallel line.

Certain lands, flats, etc., may be taken for a public park.

SECTION 12. The board of park commissioners of said city may take, in fee or otherwise, by purchase or otherwise, for said city, for the purpose of a public park such lands, flats and lands covered by tide-water between Charles, Brimmer and Back streets and the line of the wall or embankment aforesaid, as the mayor shall approve, by filing in the registry of deeds for the county of Suffolk a description thereof sufficiently accurate for identification, signed by a majority of the commissioners, and shall construct a public park on the lands so taken; and any person whose property is so taken may have compensation therefor as determined by agreement with the board, and if they cannot agree the amount thereof may be determined by a jury in the superior court for the county of Suffolk, under the same provisions of law, so far as they may be applicable, which apply in determining the value of lands taken

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for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the board, or by such person, filed in the clerk's office of said court against said city within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

City of Boston to pay certain expenses, etc.

SECTION 13. The city of Boston shall pay the expenses incurred under sections ten, eleven and twelve of this act, except as otherwise provided in section ten of this act; and to meet said expenses the city treasurer of the city shall, from time to time, on the request of the mayor, issue and sell bonds of the city to an amount not exceeding eight hundred thousand dollars, and the bonds so issued shall not be reckoned in determining the legal limit of indebtedness of the city.

City treasurer to issue bonds, etc.

The Boston and Maine Railroad to remove certain structures, etc.

SECTION 14. The lock shall be built above the lower line of the dam, and the Boston and Maine Railroad shall, before the dam is completed, remove its bridge, piles and any other structures in Charles river which are southerly or westerly of a line defined in red on a plan filed in the office of the board of harbor and land commissioners marked "Plan showing line from above or southwest of which the Boston & Maine Railroad shall remove all of its structures in Charles River and between the harbor lines, May 25, 1903. Woodward Emery, Chairman of Harbor and Land Commissioners"; and may rebuild the same northerly and easterly of the line so defined. The draw in the new bridge shall not be easterly of nor more than fifty feet westerly from the location of the present draw, and shall be so located as to be directly opposite the lock. Within the limits herein prescribed the commission shall determine the position of the lock and draw.

Enforcement of provisions of act, etc.

SECTION 15. The supreme judicial court and the superior court shall, upon application of any party in interest, including any owner or occupant of property abutting on the basin or on Broad canal or Lechmere canal, have jurisdiction to enforce, or prevent violation of, any provision of this act and any order, rule or regulation made under authority thereof.

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SECTION 16. Chapter three hundred and forty-four of the acts of the year eighteen hundred and ninety-one, as amended by section one of chapter four hundred and thirty-five of the acts of the year eighteen hundred and ninety-three, and chapter five hundred and thirty-one of the acts of the year eighteen hundred and ninety-eight are hereby repealed. Repeal.

SECTION 17. This act shall take effect on the first day of July in the year nineteen hundred and three. When to take effect.

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INDEX TO ACT.

A.

	SECTION	PAGE
Abutters, repairing or rebuilding of walls and wharves shall be done by,	4	53
Accounts, commission shall keep,	2	51
Act shall take effect,	17	59
Annual report, commission shall make,	2	51
Appointment of commissioners,	1	51
Apportionment of expenses,	9	56
Assistants, commission may appoint,	2	51

B.

Basin, commission shall dredge,	4	52
Basin, Metropolitan Park Commission shall control,	7	54
Basin, permanent water level,	3	52
Basin, rules and regulations,	7	54
Basin, water level shall be maintained,	7	55
Board of Health of Boston may require dredging,	10	56
Board of Park Commissioners of Boston may build wall or embankment,	11	57
Board of Park Commissioners of Boston may take lands,	12	57
Board of Park Commissioners of Boston may construct park,	12	57
Bonds, city treasurer of Boston shall issue,	13	58
Bonds, Treasurer and Receiver-General shall issue,	8	55
Boston, city of, may construct conduits,	10	56
Boston, city of, shall construct conduit,	10	56
Boston, city of, shall construct sewer,	10	56
Boston, city of, may do dredging,	10	56
Boston, city of, shall pay expenses,	13	58
Boston, city of, shall reconstruct connections between river and Fens,	10	56
Boston & Maine Railroad may rebuild bridge,	14	58
Boston & Maine Railroad shall remove bridge, etc.,	14	58
Bridge of Boston & Maine Railroad, time of removal,	14	58
Broad canal, commission shall dredge,	4	52
Broad canal, depths of,	4	52
Broad canal, maintenance of,	7	54

C.

Channels and canals, commission shall dredge,	4	52
Channels and canals, maintenance of,	7	54
Channels, dimensions of,	4	52
Charles River Basin Commission,	1	51
Charles River Basin loan,	8	55

Digitized by Google

	SECTION	PAGE
Commissioners, appointment of,	1	51
Commissioners, residence of,	1	51
Commissioners, salaries of,	1	51
Commissioners, term of,	1	51
Commissioners, vacancies shall be filled,	1	51
Commission may appoint secretary, engineers and assistants,	2	51
Commission may provide temporary highway bridge and approaches,	3	52
Commission may take lands,	6	53
Commission, powers and duties,	2	51
Commission shall construct dam,	3	52
Commission shall construct marginal conduits,	5	53
Commission shall determine position of lock and draw,	14	58
Commission shall dredge,	4	52
Commission shall keep accurate accounts,	2	51
Commission shall make annual report,	2	51
Commission shall strengthen walls and wharves,	4	53
Conduit, city of Boston shall construct,	10	56
Conduits, city of Boston may construct,	10	56
Conduits, commission shall construct,	5	53
Conduits, location and use of,	5, 10	53, 56
Conduits, time of construction,	5, 10	53, 56
Connections between river and Fens, city of Boston shall reconstruct,	10	56
Courts, jurisdiction of,	6, 12, 15	54, 57, 58
Craigie bridge, commission shall remove,	3	52

D.

Dam, commission shall construct,	3	52
Dam, location and dimensions of,	3	52
Dam, Metropolitan Park Commission shall control,	7	54
Dam, United States to authorize construction of,	2	51
Draw, commission shall determine position of,	14	58
Draw, location of,	14	58
Drawbridge or drawbridges, dam shall be built with,	3	52
Dredging, city of Boston may do,	10	56
Dredging, commission shall do,	4	52
Dredging, manner of,	4	53
Dredging, time of completion,	4	53

E.

Embankment, wall or,	11	57
Enforcement of provisions of act, etc.,	15	58
Engineers, commission may appoint,	2	51
Expenses, apportionment of,	9	56
Expenses, city of Boston shall pay,	13	58
Expenses, Commonwealth shall pay,	8	55
Expense to be paid out of appropriation for sewer construction,	10	56

H.

Highway, maintenance and operation of,	3	52
Highway shall constitute part of dam,	3	52

Digitized by Google

I.

	SECTION	PAGE
Interest, provision for,	9	56

J.

Jury in superior court may determine compensation,	6, 12	54, 57

L.

Lands, Board of Park Commissioners of Boston may take,	12	57
Lands, commission may take,	6	53
Lands, payments for,	6, 12	54, 57
Lechmere canal, commission shall dredge,	4	52
Lechmere canal, depths of,	4	52
Lechmere canal, maintenance of,	7	54
Lock, commission shall determine position of,	14	58
Lock, dimensions of,	3	52
Lock, location of,	14	58
Lock, Metropolitan Park Commission shall control,	7	54
Lock, operation and maintenance of,	7	54
Lock, dam shall be furnished with,	3	52
Lock, United States to authorize construction of,	2	51

M.

Malarial mosquitoes, destruction of,	4	53
Mayor of Boston may request city treasurer to issue and sell bonds,	13	58
Mayor of Boston to approve building of wall or embankment,	11	57
Mayor of Boston to approve taking of lands for public park,	12	57
Mayor of Boston to designate officer or officers to do dredging, etc.,	10	56
Metropolitan Park Commission may make rules and regulations,	7	54
Metropolitan Park Commission may order removal of sewage or factory waste,	7	55
Metropolitan Park Commission, no sewer, drain, etc., shall be connected with basin without approval of,	7	55
Metropolitan Park Commission shall control dam, etc.,	7	54
Metropolitan Park Commission shall maintain water in basin,	7	55
Metropolitan Park Commission shall operate and maintain lock, etc.,	7	54

P.

Park, Board of Park Commissioners of Boston may construct,	12	57
Park or parkway may constitute part of dam,	3	52
Payment of expenses,	8, 10, 13	55, 56, 58
Payments, Treasurer and Receiver-General shall determine,	9	56
Powers and duties of commission,	2	51

Q.

Quorum, two shall constitute,	1	51

Digitized by Google

R.

	SECTION	PAGE
Repeal,	16	59
Residence of commissioners,	1	51
Rules and regulations,	7	54

S.

Salaries of commissioners,	1	51
Secretary, commission may appoint,	2	51
Sewerage entering basin, Metropolitan Park Commission to control,	7	55
Sewer, city of Boston shall construct,	10	56
Sinking fund requirements, provision for,	9	56

T.

Temporary highway bridge and approaches, commission may provide,	3	52
Term of commissioners,	1	51

U.

United States, authority to build dam and lock,	2	51

V.

Vacancies shall be filled,	1	51

W.

Wall or embankment, Board of Park Commissioners of Boston may build,	11	57
Wall or embankment, location of,	11	57
Walls and wharves, repairing or rebuilding shall be done by abutters,	4	53
Walls and wharves, commission shall strengthen,	4	53
Wasteways, dam shall be built with,	3	52

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APPENDIX B.

CONTRACTS MADE DURING THE

1.	1. No. of Contract.	2. WORK.	3. No. of Bids.	AMOUNT OF BID. 4. Next to Lowest.	5. Lowest.	6. Contractor.
1	1	Dam and lock in the Charles River.	11	$801,607 50	$761,900 00	Holbrook, Cabot & Rollins Corporation, Boston, Mass.
2	2	Wooden block paving for temporary bridge.	-[1]	-[1]	11,700 00	United States Wood Preserving Company, New York, N. Y.

[1] Contract based upon this bid.

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APPENDIX B.

YEAR ENDING SEPT. 30, 1905.

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Sept. 30, 1905.	
Jan. 14, '05,	July 15, '08,	-	For coffer-dam at the Boston end of dam, $70,000; coffer-dam at the Cambridge end of dam, $27,000; earth excavation, $0.34, $0.38, $0.40, $0.41, and $0.45 per cu. yd.; coarse gravel, $0.75 per cu. yd.; broken stone or screened gravel, $1.50 per cu. yd.; riprap, $1.50 per ton of 2,000 lbs.; round piles in place, $0.24, $0.30, $0.14, $0.15 and $0.18 per lin. ft.; long-leaf yellow pine lumber, $60 per M. ft. B. M.; spruce lumber, $46, $50, and $35 per M. ft. B. M.; wrought iron and steel, $0.06 per lb.; cast iron and cast steel, $0.03 per lb.; concrete masonry, $6.50, $6, $4.50 and $5 per cu. yd.; ashlar masonry, $18 and $20.25 per cu. yd.; dimension stone masonry, $36 per cu. yd.; face dressing, $0.50 and $0.80 per sq. ft.; placing iron and other metal work, $25 per ton of 2,000 lbs.	$801,607 50	$101,930 12	1
Mar. 23, '05,	May 12, '05,	-	For furnishing and laying wooden block paving, $3 per sq. yd.	11,700 00	4,782 52	2

[1] Competitive bids were not received on this contract.

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CONTRACTS MADE DURING THE YEAR

1. No. of Contract.	2. WORK.	3. No. of Bids.	AMOUNT OF BID. 4. Next to Lowest.	5. Lowest.	6. Contractor.
1	3	Section 2 of the Boston marginal conduit.	10	$53,309 25	$50,800 00[1]	James Driscoll & Son, Brookline, Mass.
2	4	Cast-iron pipes and special castings.	2	6,500 12	5,640 75[1]	Camden Iron Works, Philadelphia, Pa.
3	5	Furnishing and erecting pumps.	2	9,533 00[1]	7,423 00	Henry R. Worthington, Boston, Mass.
4	6	Castings and other metal.	-[2]	-[2]	6,013 74	Gibby Foundry Company, East Boston, Mass.
5	7[3]	Yellow pine lumber for temporary bridge.	-[2]	-[2]	-[2]	George McQuesten Company, Boston, Mass.
6	8[3]	Granite paving blocks for temporary bridge.	3	1,960 00	1,923 25[1]	Rockport Granite Company, Rockport, Mass.

[1] Contract based upon this bid.

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ENDING SEPT. 30, 1905 — *Continued.*

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Sept. 30, 1905.	
June 13, '05,	Nov. 20, '05,	-	For earth excavation and refill, $8.50 and $7 per lin. ft. of trench; rock excavation, $5 per cu. yd.; piles, $0.14 per lin. ft.; underdrain, $0.75 per lin. ft.; concrete masonry, $7.50 and $3.75 per cu. yd.; iron and other metal work, $8 per ton of 2,000 lbs.; sheeting, $18 per M. ft. B. M.; crossings of Fruit and Cambridge street overflows, $8.	$50,600 00	$12,972 44	1
July 18, '05,	Sept. 16, '05,	-	For all standard straight pipe, $24.90 per ton of 2,000 lbs.; all standard special castings, $52.50 per ton of 2,000 lbs.; all special castings other than standard, $95 per ton of 2,000 lbs.	5,640 75	-	2
Sept. 30, '05,	Apr. 1, '06,	-	For furnishing and erecting Pump No. 1, $5,542; Pump No. 2, $2,525; Pump No. 3, $1,466.	9,533 00	-	3
July 27, '05,	Apr. 1, '06,	-	For iron castings unfinished, $0.0393 per lb.; finished iron castings, $0.0395 per lb.; finished steel castings, $0.1032 per lb.; composition, $0.43 per lb.; finished steel forgings, $0.0708 per lb.; wrought iron and steel rods, bolts, etc., $0.12 per lb.; rolled steel plates, $0.05 per lb.	6,013 74	-	4
Feb. 14, '05,	-	July 22, '05,	For Schedule No. 1, $30 per M. ft. B. M.; Schedule No. 2, $34 per M. ft. B. M.; Schedule No. 3, $34 per M. ft. B. M.; Schedule No. 4, $29 per M. ft. B. M.	12,476 58	12,476 58	5
Mar. 22, '05,	Apr. 12, '05,	June 15, '05,	For 35,000 granite paving blocks, $54.95 per thousand.	1,927 10	1,927 10	6

[1] Competitive bids were not received on this contract.

[2] Contract completed.

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CONTRACTS MADE DURING THE YEAR

1. No. of Contract.	2. WORK.	3. No. of Bids.	AMOUNT OF BID. 4. Next to Lowest.	5. Lowest.	6. Contractor.
1	9[1]	Granite edgestones for temporary bridge.	3	$532 00	$525 00[2]	New England Granite Company, Pigeon Cove, Mass.
2	10[1]	Motors for draw in temporary bridge.	-[3]	-[3]	812 50	General Electric Company, Boston, Mass.
3	11[1]	Spruce lumber for temporary bridge.	3	4,547 36	4,492 58[2]	E. D. Sawyer Lumber Company, East Cambridge, Mass.
4	12[1]	Tees for wheel-guard on temporary bridge.	2	891 54	728 09[2]	Harrington, Robinson & Company, Boston, Mass.
5	13	Twisted steel rods for reenforcing concrete.	2	5,219 20[2]	5,049 12[4]	Aberthaw Construction Company, Boston, Mass.
6	14	Castings for overflow, Boston marginal conduit.	3	749 00	736 80[2]	Gibby Foundry Company.
7	15	Composition at dam and lock.	3	1,821 00	1,773 44[2]	Coffin Valve Company, Neponset, Mass.
8	16	Brackets for lock gate bearings at lock.	2	1,343 33	1,301 30[2]	The Boston Bridge Works, Boston, Mass.
9	17	Welded pipe for electric conduits under lock.	3	4,385 00	3,965 00[2]	The Lumsden & Van Stone Company, Boston, Mass.
10	18	Gate valves at lock, .	3	861 95[2]	858 39[2]	The Ludlow Valve Manufacturing Company, Boston, Mass.
11	19	Plans, specifications, engineering and patent rights for superstructure, operating machinery, etc., for drawbridge over lock.	-[3]	-[3]	4,500 00[2]	The Scherzer Rolling Lift Bridge Company, Chicago, Ill.
12	Special Order.[3]	Machinery for draw in temporary bridge.	-[3]	-[3]	-[3]	H. J. Shaw, Cambridge, Mass.
		Totals, . . .	. . .	. . .	. . .	. . . . .

[1] Contract completed.
[2] Contract based upon this bid.
[3] Competitive bids were not received on this contract.

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ENDING SEPT. 30, 1905 — *Concluded.*

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Sept. 30, 1905.	
Mar. 22, '05,	Apr. 6, '05,	Apr. 17, '05,	For 700 lin. ft. of granite edgestones, $0.75 per lin. ft.	$525 00	$525 00	1
Mar. 22, '05,	Apr. 19, '05,	May 31, '05,	For the whole work, $812.50.	812 50	812 50	2
Mar. 23, '05,	Apr. 20, '05,	June 19, '05,	For 219,150 ft. B. M. spruce lumber, $20.50 per M. ft. B. M.	4,495 43	4,495 43	3
Mar. 29, '05,	Apr. 19, '05,	May 18, '05,	For about 3,020 ft. of tees, $0.0245 per lb.	817 08	817 08	4
May 29, '05,	Sept. 15, '05,	-	For about 126.4 tons square twisted steel rods, $2.05 and $2.25 per hundred lbs.	5,219 20	4,614 80	5
July 22, '05,	Sept. 1, '05,	-	For the whole work, $736.80.	736 80	-	6
July 31, '05,	Oct. 20, '05,	-	For Navy bronze, $0.30125 per lb.; Tobin bronze, $0.285 per lb.	1,773 44	2	7
Aug. 2, '05,	Oct. 20, '05,	-	For 31,000 lbs. steel, $0.0339 per lb.; pickling 8 tons, $8.05 per ton.	1,301 30	-	8
Aug. 18, '05,	Oct. 17, '05,	-	For the whole work $3,972.75.	3,972 75	-	9
Aug. 25, '05,	Apr. 1, '06,	-	For 30-inch valves, $202.75; 24-inch, $153 and $128.95; 20-inch, $112.80; 16-inch, $90.20; 14-inch, $55.50; 12-inch, $63.25; 8-inch, $22.50; 6-inch, $33.	861 95	-	10
Aug. 25, '05,	-	-	- -	4,500 00	-	11
Feb. 24, '05,	-	July 1, '05,	- -	3,785 13	3,785 13	12
. . .	. . .	. . .	. . . . .	$928,299 25	$149,141 05	

[4] Bid did not comply with requirements for delivery.
[5] Bid based on furnishing part sluice gates.

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PUBLIC DOCUMENT . . . . . No. 72.

SECOND ANNUAL REPORT

OF THE

MASSACHUSETTS BOARD OF REGISTRATION IN VETERINARY MEDICINE.

FOR THE YEAR 1905.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1906.

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Approved by

The State Board of Publication.

MEMBERS

OF THE

MASSACHUSETTS BOARD OF REGISTRATION IN VETERINARY MEDICINE,

1905.

LANGDON FROTHINGHAM, M.D.V., *Chairman*,	BOSTON.
ELMER W. BABSON, M.D.V., *Secretary*,	GLOUCESTER.
GEORGE P. PENNIMAN, D.V.S.,	WORCESTER.
HENRY S. LEWIS, M.D.V.,	CHELSEA.
THOMAS E. MALONEY, V.S.,	FALL RIVER.

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Commonwealth of Massachusetts.

REPORT.

BOARD OF REGISTRATION IN VETERINARY MEDICINE,
SECRETARY'S OFFICE, Dec. 15, 1905.

To His Excellency WILLIAM L. DOUGLAS, *Governor.*

SIR: — In compliance with the requirements of chapter 249 of the Acts of 1903, the Board of Registration in Veterinary Medicine submits its annual report for the year 1905.

The number of persons who have applied for registration during the year is 26, all of whom have been examined except 3.

The number of applicants on the rejected list who have been re-examined is 5, 3 of whom have secured registration.

The whole number of individual examinations given this year is 30. The result is as follows: —

	Examined.	Registered.	Rejected.
February examination, . . .	12	9	3
July examination, ...	14	8	6
November examination, . . .	4	2	2

Nineteen men have therefore been registered as a result of examination, and two men have been registered whose applications were under reconsideration at the time of our last report.

The Board has registered 379 veterinarians to date.

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It having been proved to the satisfaction of the Board that a certificate had been granted to an applicant under the three-year clause of section 3, chapter 249, Acts of 1903, who either swore to a false statement, or else that which he considered the practice of veterinary medicine could not be so construed by the Board under any circumstances; therefore, in accordance with advice from the Attorney-General, the Board revoked and annulled this certificate.

As in the future the attention of the Board may be brought to other cases where a certificate has been granted to an applicant who has misrepresented facts upon which depended the granting of said certificate, or where the holder of a certificate has committed some felony or crime, it is recommended that an amendment be made to chapter 249, Acts of 1903, explicitly conferring upon the Board power in such cases to revoke and annul certificates.

The Board has held 13 meetings during the year, of which 3 were for the purpose of examination.

One hundred and three complaints of violation of the law have been received; but, as the law makes no provision for investigating complaints, nothing very effectual could be accomplished in this direction. As the benefit of the law comes chiefly from its enforcement, it is recommended that this Board be given the same power as that conferred on the Board of Registration in Medicine, in chapter 76, Revised Laws, section 6, which reads as follows: —

> The Board shall investigate all complaints of the violation of the provisions of section 8, and report the same to the proper prosecuting officers.

It is the unanimous opinion of the members of the Board that the services performed by them and necessitated by the requirements of the law warrant the request for an increase in salary.

The law requires the Board to examine applicants in the following subjects: anatomy, physiology, materia medica, therapeutics, bacteriology, pathology, animal parasites, diagnosis and practice, obstetrics and surgery. It has been found that this work cannot be successfully accomplished in

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one day; and the Board recommends that the application fee for examination be increased from $5 to $20, in order that the Commonwealth may be adequately compensated for its expense in conducting the examination.

The receipts of the Board, which according to law have been paid into the treasury of the Commonwealth, have been as follows: —

Form B, fees at $2 (reconsidered and accepted),	$4 00
Form C, fees at $5,	140 00
Total,	$144 00

The expenses of the Board have been as follows: —

Salaries and travelling expenses of members,	$457 59
Clerical assistance,	233 80
Printing and postage,	129 82
Stationery and supplies,	22 55
Miscellaneous,	32 93
Total,	$876 69

In the Appendix to this report will be found a copy of the law under which the Board acts.

Respectfully submitted,

LANGDON FROTHINGHAM.
E. W. BABSON.
THOS. E. MALONEY.
G. P. PENNIMAN.
HENRY S. LEWIS.

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APPENDIX.

LAW RELATING TO THE REGISTRATION OF VETERINARIANS.

[Chapter 249, Acts of 1903.]

AN ACT TO PROVIDE FOR ESTABLISHING A BOARD OF REGISTRATION IN VETERINARY MEDICINE.

Be it enacted, etc., as follows:

SECTION 1. The governor, with the advice and consent of the council, shall appoint five veterinarians, residents of this Commonwealth, and graduates of a school of veterinary medicine recognized by the American Veterinary Medical Association, who shall constitute a board of registration in veterinary medicine. Their terms of office shall begin on the first day of January in the year nineteen hundred and four, and they shall hold office, one for one year, one for two years, one for three years, one for four years and one for five years, or until their successors are appointed; and the governor shall appoint annually thereafter, before the first day of December, beginning with the year nineteen hundred and four, one veterinarian, qualified as aforesaid, who shall hold office for five years from the first day of January next ensuing. Any member of said board may be removed from office for cause by the governor, with the advice and consent of the council. The members of the board shall each receive a salary of fifty dollars a year, and their necessary travelling and contingent expenses actually incurred in attending meetings of the board. The said salary and expenses shall be paid out of the treasury of the Commonwealth.

SECTION 2. The members of said board shall meet on the second Tuesday of January in each year, at such time and place as they shall determine, and shall immediately proceed to organize by electing a chairman and a secretary, who shall hold their re-

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spective offices for the term of one year. Said board shall hold regular meetings on the first Tuesday of March, July and November of each year, and such additional meetings at such times and places as they may determine. Said board may make by-laws and rules not inconsistent with law necessary to carry out the provisions of this act.

SECTION 3. Said board shall notify all persons practicing veterinary medicine in this Commonwealth, of the provisions of this act by publishing the same in one or more newspapers in this Commonwealth, and every such person who is a graduate of a recognized school of veterinary medicine, and also every person who has been a practitioner of veterinary medicine in this Commonwealth for a period of three years next prior to the passage of this act, shall, upon the payment of a fee of two dollars, be entitled to registration, and said board shall issue to him a certificate thereof signed by its chairman and secretary. Registration under the provisions of this section shall cease on the first day of September in the year nineteen hundred and four. All applications for registration under this act shall be made upon blanks furnished by the board, and shall be signed and sworn to by the applicant.

SECTION 4. Any person not entitled to registration as aforesaid who is twenty-one years of age shall, upon the payment of a fee of five dollars, be entitled to examination, and if found qualified by the board shall be registered and shall receive a certificate of registration as provided in section three. Any person who fails to pass a satisfactory examination and is therefore refused registration may be re-examined at any regular meeting of the board within two years of the time of such refusal, without additional fee, and thereafter may be examined at any regular meeting upon the payment of a fee of five dollars for each examination. The fees received for examination and registration of applicants before the board shall be paid monthly by the secretary of the board into the treasury of the Commonwealth.

SECTION 5. Examinations shall be held at least twice annually, and shall be exclusively in writing, in English. There shall be suitable questions to test the requisite knowledge of the applicants in the following subjects: — Anatomy, surgery, physiology, animal parasites, obstetrics, pathology, bacteriology, diagnosis and practice, therapeutics and materia medica.

SECTION 6. It shall be the duty of said board to keep a register of all practitioners qualified under this act, which shall be open to public inspection, and to make an annual report to the governor.

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SECTION 7. It shall be unlawful after the first day of September in the year nineteen hundred and four for any person to practice veterinary medicine, or any branch thereof, in this Commonwealth who does not hold a certificate issued by said board.

SECTION 8. Any person not registered as provided by this act who shall practice veterinary medicine or any branch thereof in this Commonwealth shall be guilty of a misdemeanor, and shall upon conviction thereof be punished by a fine of not less than fifty dollars or by imprisonment for a term not exceeding two months, or by both such fine and imprisonment.

SECTION 9. The provisions of this act shall not be construed to prohibit advice or service, in a case of emergency, by a person not entitled to practice veterinary medicine under this act, and the provisions of section nine of chapter seventy-six of the Revised Laws relating to the practice of medicine within the Commonwealth by physicians and surgeons shall, so far as they may be applicable, apply to the practice of veterinary medicine or any branch thereof by veterinarians.

SECTION 10. Except as otherwise provided herein this act shall take effect upon its passage. [*Approved April 16, 1903.*

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spective offices for the term of one year.
regular meetings on the first Tuesda
ber of each year, and such ad
places as they may deter
rules not inconsistent
sions of this act.

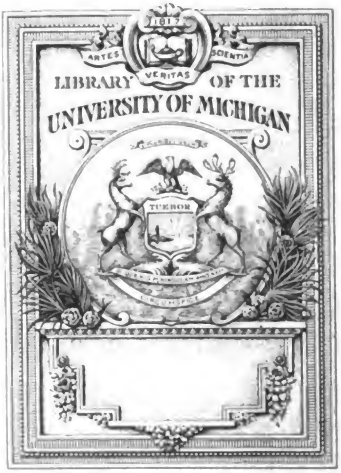
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